



United States
Department of
Agriculture



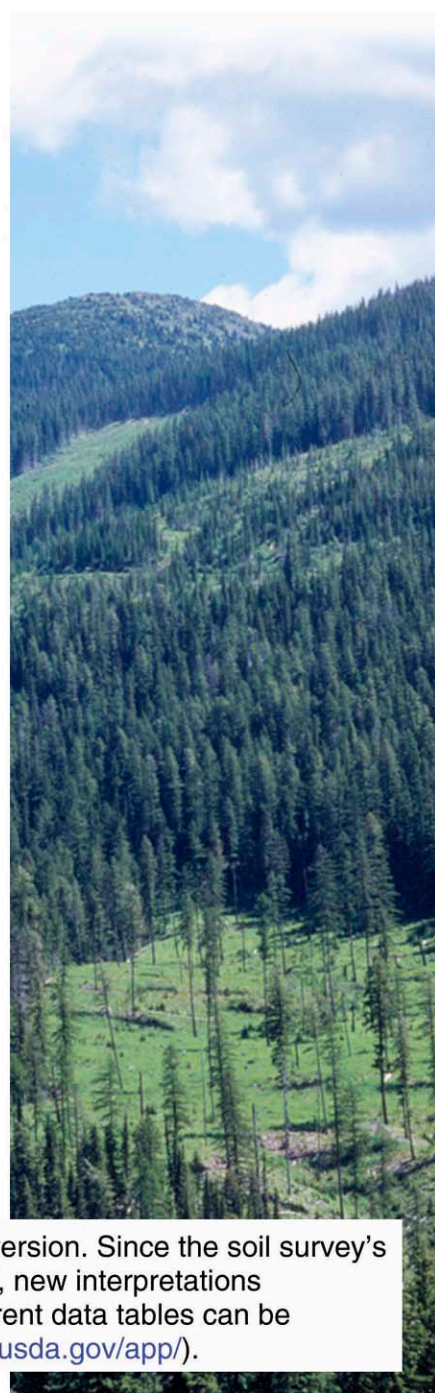
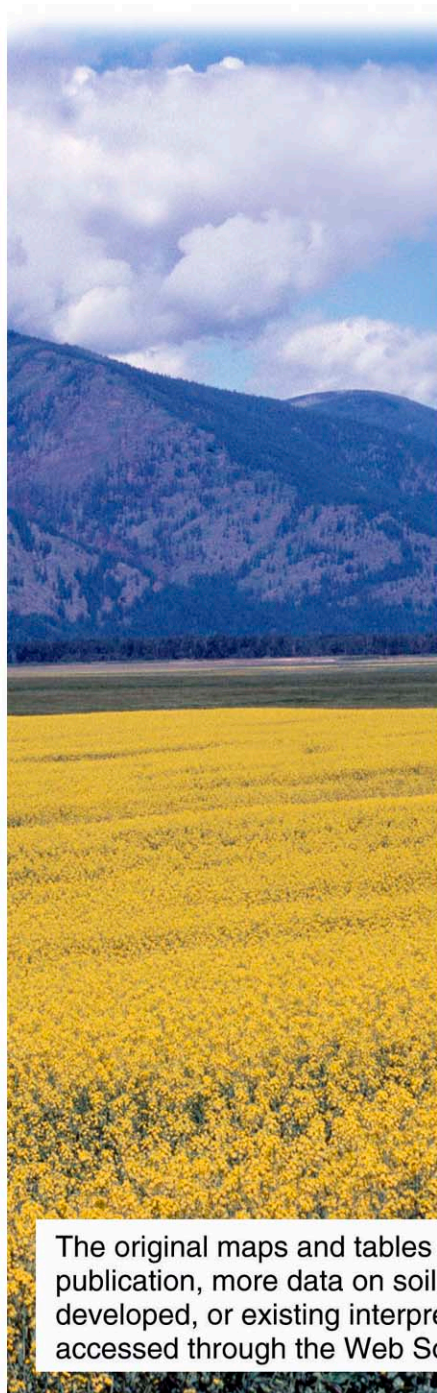
Natural
Resources
Conservation
Service



In cooperation with the United
States Department of the
Interior, Bureau of Land
Management; University of
Idaho, College of Agriculture;
and Idaho Soil Conservation
Commission

ID601—Soil Survey of Boundary County Area, Idaho

Part I



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).

How to Use This Soil Survey

General Soil Map

The general soil map shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

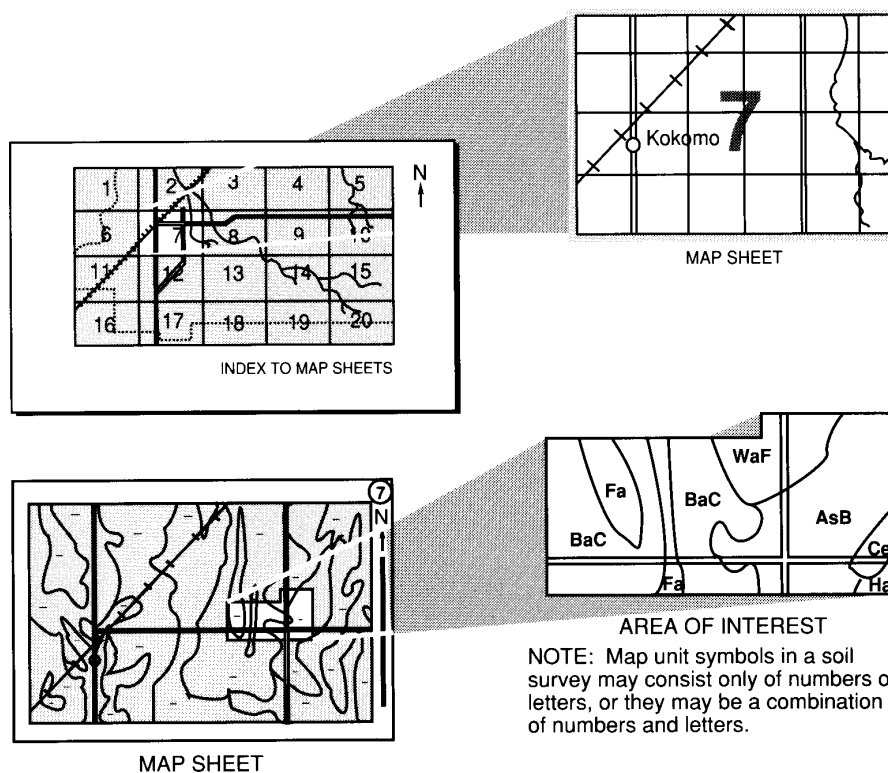
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate that area on the **Index to Map Sheets**. Go to the Web Soil Survey for more information (<http://websoilsurvey.nrcs.usda.gov/app/>)

Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described. See the Contents for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2000. Soil names and descriptions were approved in 2001. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2000. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of the Interior, Bureau of Land Management; the University of Idaho, College of Agriculture; and the Idaho Soil Conservation Commission. The survey is part of the technical assistance furnished to the Boundary Soil Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: *Left*—Schnoorson silt loam, protected, drained, 0 to 2 percent slopes, in foreground used for canola and wheat production. Rock outcrop-McArthur, very stony complex, 65 to 100 percent slopes, in background used for timber production and wildlife habitat. *Center*—Schnoorson silt loam, protected, drained, 0 to 2 percent slopes, in foreground used for wheat production. Caboose-Wishbone complex, 15 to 35 percent slopes, in middle ground used for timber production and pasture. Dufort-Rock outcrop-Kriest complex, 35 to 65 percent slopes, in background used for timber production and wildlife habitat. *Right*—Pend Oreille ashy silt loam, 35 to 65 percent slopes, used for timber production and wildlife habitat.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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For tables with the most current data, please visit the
Soil Data Mart at <http://soildatamart.nrcs.usda.gov/>.

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Richard W. Sims
State Conservationist
Natural Resources Conservation Service

Soil Survey of Boundary County Area, Idaho

By Charles J. Weisel, Natural Resources Conservation Service

Fieldwork by Charles J. Weisel, Natural Resources Conservation Service, and
Scott H. Bare, Idaho Soil Conservation Commission

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the United States Department of the Interior, Bureau of Land Management;
University of Idaho, College of Agriculture; and
Idaho Soil Conservation Commission

BOUNDARY COUNTY AREA is located in the northernmost part of the Idaho panhandle, bordering Canada (fig. 1). The survey area includes most of the private and state lands in the central and eastern portions of Boundary County but does not include contiguous parts of the Idaho Panhandle (Kaniksu) National Forest. The total survey area encompasses 249,000 acres, or about 389 square miles.

The survey area consists of rugged, forested mountainous or hilly terrain; the broad Kootenai River valley; gently sloping benchlands; and other comparatively narrow valleys. Three mountain ranges occur within the survey area. These ranges include the Selkirk Mountains in the west, the Purcell Mountains in the northeast, and the Cabinet Mountains in the southeast. Besides the Kootenai River valley, other prominent valleys include Moyie River and Round Prairie valleys in the north and Deep Creek and Paradise valleys in the south.

The Kootenai River, which flows northwest, and the Moyie River, which flows south, are the principal drainages. Deep Creek in the southern part of the survey area flows north from McArthur Lake.

The lowest point, about 1,745-foot elevation, is along the Kootenai River near Porthill. Bonners Ferry, situated on a river terrace, is located at about 1,775-foot elevation. The highest elevations are in the southeast and southwest, where some mountain peaks are greater than 6,000-foot elevation.

This soil survey updates the "Soil Survey of Boundary Area, Idaho" (USDA, 1980). The present survey provides additional information and has larger maps that show the soils in greater detail.

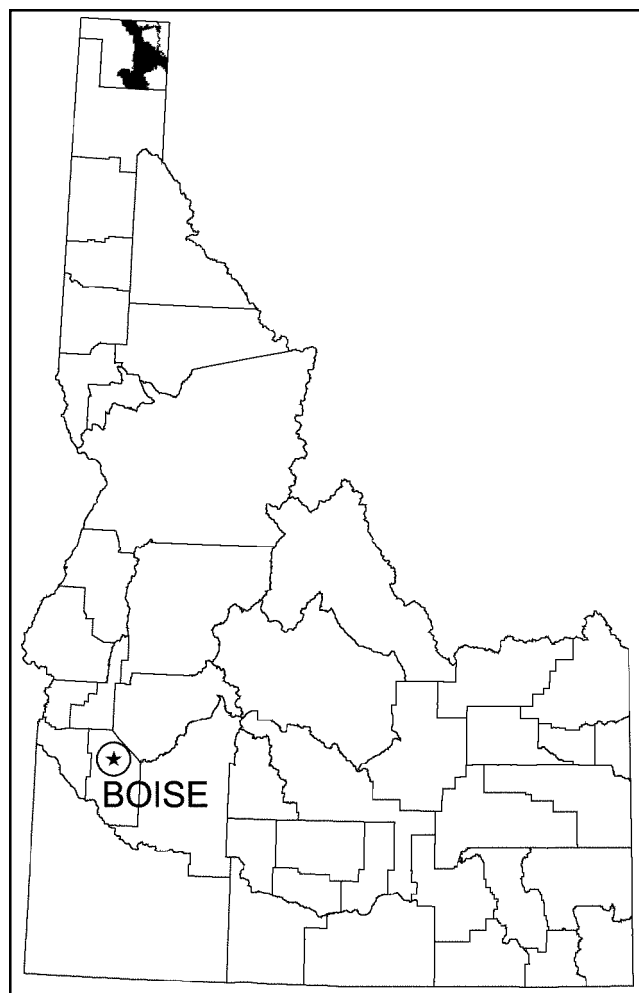


Figure 1.—Location of Boundary County Area, Idaho

General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are history and development, geology, natural resources, agriculture, and climate.

History and Development

The earliest known inhabitants within the survey area were members of the Kootenai tribe of Native Americans. The Kootenai Indians hunted, fished, and gathered edible berries and roots. The European presence in the area began in the early 1800s with the arrival of French fur traders. In 1808, David Thompson, representing the Northwest Fur Company, came to the area in search of beaver.

In 1846, Father Pierre Jean DeSmet, a Catholic missionary, visited the Kootenai Tribe. Government surveyors of the Boundary Commission arrived in 1858 to establish the border between the United States and Canada.

Gold was discovered in British Columbia in 1863. Thousands of prospectors surged northward along the Wildhorse Trail, a route to the gold mines. In 1864, Edwin Bonner, originally from Walla Walla, Washington, established a ferry across the Kootenai River. Bonner's ferry provided the name for the community that sprung up there. The town of Bonners Ferry was formally established in 1893.

As more people began to settle in the area, the economy diversified. Farms and ranches began to appear up and down the Kootenai River valley and on the surrounding benchlands. The area soon became known for its vast timber stands and became a bustling center of logging activity. Log transportation was accomplished by use of flumes, river log drives, horses, and railroads to carry logs to the mills.

In 1915, Bonners Ferry became the county seat of Boundary County. Bonners Ferry has grown over the decades as a center for the timber industry in the area. The population of the entire area has fluctuated with the amount of activity in the lumber industry. In 1999, the population of Boundary County was 9,977, and the population of Bonners Ferry was 2,404. Other communities in the county are Naples, Moyie Springs, Porthill, and Eastport.

Railroads, highways, and an airport at Bonners Ferry supply transportation facilities. Graded roads, many of which were built mainly for logging, extend along the principal streams and rivers. Two major highways run through the area. U.S. Highway 95 runs

north and south from the Bonner County line to the U.S.-Canada border. U.S. Highway 2 runs north and east to the Montana state line. State Highway 1 branches off U.S. Highway 95 near Deer Park and runs northwest to Porthill at the U.S.-Canada border.

Bonners Ferry has elementary, middle, and high school facilities. The outlying areas are well supplied with district schools. Health care facilities and a community hospital are located in Bonners Ferry.

The timber industry continues to be very important to the economy of the area. Several sawmills and plants for forest products are located throughout the area. The area's natural scenic beauty, coupled with opportunities for outdoor recreation, has brought tourism to the forefront of the area's economy.

As the Kootenai River flood plain was drained and protected from flooding by levees, farms were established on the highly productive soils of the Kootenai valley. Farming and the associated agricultural supply business have become very important industries in the area.

Geology

Terril Stevenson, Idaho State Geologist, Natural Resources Conservation Service, prepared this section.

The Boundary County soil survey area is within the Northern Rocky Mountains Geographic Province. Geologically, there are five major episodes represented by rocks of this region.

The earliest event represented by rocks of this area occurred during the Precambrian Age about 1-billion years ago. The area was a narrow, shallow marine basin and received thick deposits of sand, mud, and carbonate sediments. These deposits became sandstone, siltstone, mudstone, dolomite, and limestone of the Belt Supergroup formations. These sedimentary rocks were metamorphosed by later events, with some forming slate, argillite, siltite, quartzite, marble, schist, and gneiss. Most of the panhandle is underlain by Precambrian Age Belt Series formations, and most of the exposed bedrock on the eastern side of the area is metamorphosed Belt Series sedimentary rock. Remnant sedimentary features such as mud cracks, ripple marks, cross-bedding and fossil algal stromatolites are still observed in some of the metasedimentary rock.

Belt Supergroup rocks that occur within the survey area are argillite, siltite, quartzite, and carbonates of the Prichard Formation, Ravalli Group, and Wallace Formation as well as schist, gneiss, conglomerates, and quartzites of uncertain status. Upland areas on the eastern and southern sides of the survey area,

including the Purcell and Cabinet Mountains, are developed in these formations.

Occurring during the Precambrian Age at the same time as deposition of some of the Belt Supergroup sediments was intrusion into the sediments of the Moyie sills and dikes. These are isolated, scattered bodies of dark-colored igneous rock, typically gabbro, diorite, metadiorite, diabase, and quartz diorite.

A very small area of Cambrian Age shallow marine sedimentary rock, representing the second major event, is mapped in the Purcell Mountains. This deposit is mapped as dolostone from the Metaline or Fishtrap Formations. This small deposit is the sole surviving representative of Paleozoic time.

Intrusion of the Kaniksu Batholith is the third major geologic event represented, occurring between 70- and 80-million years ago during the Cretaceous Period. Older sediments were metamorphosed and thrust faulted or pushed aside during the intrusion. Strike-slip faulting, vertical-block faulting, and anticline-syncline folding accompanied the intrusion and thrust-faulting of the older sedimentary deposits. This faulting and folding produced a series of north to northwest trending mountain ranges and valleys.

Bedrock in the Twenty Mile Creek area on the southern side of the survey area, along the western side of the Purcell Mountains, and under the glacial and alluvial valley fill in the Kootenai River and Deep Creek valley is "Kootenai" granodiorite, Wall Mountain syenite, and Twenty Mile Creek quartz monzonite from the Batholith intrusions. Isolated outcrops of the granodiorite occur throughout the valley area.

The fourth major geologic event occurred between 37- and 57-million years ago during the Eocene Epoch of the Tertiary Period. The Selkirk Crest plutons were intruded into the older metasediments and igneous rock. The Selkirk Mountains on the western side of the survey area are predominantly quartz monzonite from these intrusions.

The fifth major event occurred between 100,000- and 11,000 years ago during the Pleistocene "ice ages." The Cordilleran Ice Sheet covered most of the valley areas, with only the higher mountain peaks exposed. These ice sheets are similar to the continental glacier of Greenland today. The region received enough snow that even the high mountain peaks were glaciated with alpine glaciers, similar to mountain glaciers of the Alps. Much of the surface materials and topography existing today result from the glacial episodes. The craggy, jagged peaks were eroded by alpine glaciers, and mountain valleys were filled with moraine and outwash deposits. The continental ice sheet extended as far

south as Coeur d'Alene Lake, leaving thick deposits of glacial till and pale lake silts as well as "erratic" boulders transported to the area and deposited as the ice melted. The continental glaciers also scoured some areas, leaving slick, polished bedrock exposed at the surface.

The most recent glaciation of the area by the Cordilleran Ice Sheet occurred between 11,000- and 25,000-years ago. The Purcell Trench lobe of the ice sheet extended southward through the survey area. The Purcell Trench is a broad V-shaped valley scoured by the ice lobes and filled with significant thicknesses of glacial sediments. The trench is over 300-miles long and from 1- to 9-miles wide. The Kootenai River and Deep Creek both occupy the surface of these deposits in the Purcell Trench. Glacial deposits of till, drift, outwash, and lake sediment exist throughout the survey area.

During the Pleistocene, many large lakes were formed as ice dammed then-existing rivers. The entire survey area was occupied by glacial lakes at some time. Kootenai Lake filled the area of the present Kootenai River valley and the Purcell Trench, from Canada south nearly to Lake Pend Oreille. Round Prairie and the Moyie River valley were also filled with glacial lakes at times. The glacial Lake Kootenai deposits are up to 900-feet thick. Benched lake sediments and glacial outwash are mapped along the valley sides throughout the survey area.

Recent sediment deposits in the survey area include stream alluvium from the Kootenai and Moyie Rivers and tributaries, eolian or windblown deposits of ash and loess, and muck or peat materials related to the recent recession of the glacial lakes. The loess materials are also related to the glacial lakes and outwash as fine material deposited from these sources dried and was transported and redeposited by wind. The ash materials are derived mainly from the Cascade and Coast Ranges' volcanic activity in western Oregon and Washington.

Three major named faults occur in the survey area: the Kootenai Fault trends north-south along the present trace of the Kootenai River, the Round Prairie Fault trends east-west between the Moyie Range and the Cabinet Mountains, and the Moyie Fault extends north-south along the Moyie River.

Natural Resources

Soil, water, and timber are the most important natural resources in the survey area. Timber, crops, and livestock are marketable products derived from the soil. Millions of board feet of lumber are cut annually from ponderosa pine, Douglas-fir, grand fir,

western white pine, western larch, western red cedar, western hemlock, and spruce. Boards, poles, posts, shingles, and shakes are among the main products of the forest industry, while small logs and chips are used in the pulp industry. Some local timber is also used for veneer.

The survey area has abundant water resources. Two major rivers, the Kootenai and Moyie, dominate the landscape, with many smaller tributaries feeding into them. Overall, water quality in the area is considered to be very good, except for areas that have excess sediment from soil erosion. Small wetlands and ponds are scattered throughout the area, and McArthur Lake is located in the south.

Agriculture

About 68,000 acres in the survey area is used for crop production and hay and pasture. Major crops are spring wheat, winter wheat, oats, barley, alfalfa, clover seed, and canola. Ornamental nursery production and irrigated hops make up a small but significant acreage. Most of the cropland is located on the Kootenai River flood plain, which has been drained and protected from flooding by a system of ditches, pumps, and levees. The remainder of the cropland and most of the hayland and pasture is located on the high benches of cleared forestland. Some of the pasture is located on wet bottom lands and meadows along the major creeks of the area.

Timber production is carried out by both individual landowners and large timber companies.

Livestock grazing is becoming more important to the area's economy. Livestock operations include cow-calf or beef enterprises, generally less than 100 cows. Some of the large timber companies lease out their cutover timberlands for livestock grazing. Some of the federal- and state-owned lands are also leased out for livestock grazing. The average size of individual farms and ranches in the area is about 300 acres. Large corporate timberland tracts range in size from 1,000 to over 10,000 acres.

The Boundary Soil Conservation District was formed on December 6, 1947. Originally, the purpose of the district was to conserve the soil resources of Boundary County, but it has expanded to include conservation and development of all natural resources.

Climate

Summers in the survey area are warm to hot in most of the valleys but much cooler in the mountains.

Winters are colder in the mountains than the valleys. The smaller valleys are also colder in winter than the lower slopes of the adjacent mountains because of cold air drainage. Precipitation occurs in the mountains throughout the year, and a deep snowpack accumulates during winter. Snowmelt usually supplies much more water than can be used for agriculture in the area. In the valleys, precipitation in summer falls mainly as showers, although some thunderstorms occur. In winter, the ground is covered with snow much of the time. Chinook winds, which blow downslope and are warm and dry, often melt and evaporate the snow.

The table, "Temperature and Precipitation," gives data on temperature and precipitation for the survey area as recorded at Bonners Ferry in the period 1907 to 1993. The table, "Freeze Dates in Spring and Fall," shows probable dates of the first freeze in fall and the last freeze in spring. The table, "Growing Season," provides data on length of the growing season.

In winter, the average temperature is 28 degrees F, and the average daily minimum temperature is 20 degrees. The lowest temperature on record is -33 degrees. In summer, the average temperature is 64 degrees and the average daily maximum temperature is 80 degrees. The highest recorded temperature is 104 degrees.

Growing-degree days are shown in the "Temperature and Precipitation," table. Growing-degree days are equivalent to "heat units." During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 23 inches. Of this, 8 inches, or 35 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 4 inches. Thunderstorms occur on about 15 days each year, and most occur in summer.

The average seasonal snowfall is about 67 inches. On the average, 54 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 75 percent of the time possible in summer and 30 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. This information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses (USDA, 1996). Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the survey area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, soil scientists develop a concept, or model, of how the soils were formed. During mapping, this model enables soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates; kind and amount of rock fragments; distribution of plant roots; reaction; and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely

defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret data from these analyses and tests as well as field-observed characteristics and soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data for crop yields under high levels of management are modeled and validated with farm records and field or plot information on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences result from a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Temperature and Precipitation
(Recorded in the period 1907-1993 at Bonners Ferry)

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average	Average	Average	2 Years in 10		Average	Average	2 years in 10		Average	Average
	Daily	Daily		Will Have—		Number		Will Have—		Number	
	Maximum	Minimum		Maximum	Minimum	of		Less	More	of Days	
				Temperature	Temperature	Growing-		Than	Than	With	Total
				More Than	Less Than	degree				0.10 or	Snowfall
						Days*				More	
January---	31.8	18.0	24.9	50	-13	3	3.03	1.54	4.33	8	21.9
February---	38.8	22.3	30.6	54	-7	5	1.97	0.99	2.83	5	12.1
March---	48.2	27.1	37.6	66	5	45	1.61	0.82	2.29	5	4.7
April----	59.7	33.8	46.7	81	21	208	1.30	0.66	1.94	4	0.5
May-----	68.9	40.4	54.6	89	26	449	1.62	0.84	2.29	5	0.1
June-----	75.3	46.6	61.0	93	34	617	1.71	0.88	2.43	5	0.0
July-----	83.4	49.7	66.6	99	37	817	0.98	0.37	1.54	3	0.0
August----	82.4	48.3	65.4	97	35	770	1.00	0.35	1.66	2	0.0
September---	72.2	41.6	56.9	91	26	502	1.38	0.54	2.08	3	0.0
October---	57.4	34.0	45.7	76	19	195	1.94	0.67	2.98	5	0.4
November---	41.7	27.4	34.5	59	4	24	3.18	1.44	4.67	8	8.6
December---	34.2	22.1	28.1	50	-6	3	3.12	1.77	4.31	8	18.4
Yearly:											
Average---	57.8	34.3	46.1	—	—	—	—	—	—	—	—
Extreme---	104.0	-33.0	—	102	-17	—	—	—	—	—	—
Total-----	—	—	—	—	—	3,637	22.84	17.55	26.10	61	66.7

* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 degrees F).

** Average number of days per year with at least 1 inch of snow on the ground: 54

Freeze Dates in Spring and Fall
(Recorded in the period 1907-1993 at Bonners Ferry)

Probability	Temperature		
	24 Degrees F or Lower	28 Degrees F or Lower	32 Degrees F or Lower
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	April 27	May 14	June 5
2 years in 10 later than----	April 20	May 8	May 29
5 years in 10 later than----	April 6	April 26	May 17
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	October 1	September 14	August 31
2 years in 10 earlier than--	October 8	September 22	September 6
5 years in 10 earlier than--	October 22	October 6	September 17

Growing Season
(Recorded in the period 1907-1993 at Bonners Ferry)

Probability	Daily Minimum Temperature		
	Higher Than 24 Degrees F	Higher Than 28 Degrees F	Higher Than 32 Degrees F
	<i>Days</i>	<i>Days</i>	<i>Days</i>
9 years in 10-----	164	130	97
8 years in 10-----	176	141	106
5 years in 10-----	198	161	124
2 years in 10-----	220	182	141
1 year in 10-----	232	193	151

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The tables, "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," at the end of this section show the classification and extent of the soils in this survey area.

Formation of the Soils

Soil is a natural, three-dimensional body on the earth's surface. Soil has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over a period of time.

Although there are many different soils, each soil is the result of the interaction of the same five factors. These factors are the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, the physical and chemical composition of the parent material, and the length of time it took for the soil to form.

Within short distances, the combination of these factors varies, and, consequently, the soils that form differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are discussed as they relate to the soils in the survey area.

Parent Material

The soils in the Boundary County Area formed from residual, glacial, lacustrine, alluvial, and eolian parent material. The mountains are mainly residual material derived from Precambrian metasedimentary rocks and metamorphosed igneous rocks of the Kaniksu Batholith (Ross and Forrester, 1958). These rocks are highly fractured, and most soils formed in materials derived from them have a high percentage of rock fragments. The Baldeagle, Jaypeak, Katka, and McArthur soils are typical of this group. These soils also contain varying amounts of loess and volcanic ash deposited during the late Pleistocene and Holocene Epochs (USDA, 1984).

At different times during the Pleistocene Epoch, glaciers entered Idaho from Canada and advanced south through Boundary County. Many soils in the foothills and mountains are formed in glacial till that consists of varying amounts of sand, silt, gravel, cobbles, and stones deposited directly or indirectly by the action of glacial ice and melt water. This material is covered by a surficial deposit of volcanic ash and loess. The Caribouridge, Dufort, Highfalls, Idamont, Pearsoncreek, Pend Oreille, Redraven, Roman, Rubycreek, Treble, and Zee soils formed in glacial till. During the late Pleistocene Epoch, the Dodgecreek, Myrtle creek, Snowlake, and Stien soils formed in glacial outwash deposited by melt water from receding glaciers. These soils contain a high percentage of sand or rock fragments.

The volcanic ash in the survey area, which is predominately silt size, originated from many active volcanoes in western Washington and western Oregon, including Mt. St. Helens, Mt. Rainier, and Glacier Peak. The greatest contribution of ash in this area, however, came about 6,700 years ago from the eruption of Mt. Mazama, the cone of which is now Crater Lake, in southwestern Oregon. The Mazama ashfall was the only one of sufficient extent and thickness to have significantly affected the soils in the area. The ash fell over the entire area but was eventually eroded from those places that did not have a full cover of trees. Soils, such as those of the Dufort, Idamont, and Pend Oreille series, retain most of the volcanic ash and are strongly influenced by this material.

The high terraces or benches adjacent to the broad Kootenai River flood plain are primarily silty, calcareous, glaciolacustrine deposits many hundreds of feet thick. The Frycanyon, Porthill, Rubson, and Zioncreek soils occur on the gently sloping tops of the terraces. The Artnoc, Caboose, Crash, Flemingcreek, and Wishbone soils occur on the steep escarpments and terrace slopes.

Large areas of eolian sand associated with fast-moving water deposition of the lake-laid sediments are near Naples. The Elmira and Selle soils formed in these sandy, dune areas.

Soils in the Kootenai River flood plain formed mainly in relatively recent silty alluvial deposits. As water spread over the flood plain, sediment that the river had carried a long distance was deposited. Floodwaters moved slowly, so silt, clay, and very fine sands were deposited. The Farnhamton, Ritz, and Schnoorson soils formed in these alluvial deposits. The DeVoignes and Pywell soils formed in a combination of organic deposits and the alluvium.

Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. Soils form in rocks that have been broken into suitable materials by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material.

Precipitation and temperature affect the kind and amount of vegetation that grows on the soil. Vegetation decays to produce organic matter in the soil. Soils that have cool temperatures and high precipitation generally contain more organic matter and are dark colored. Soils that have warm temperatures and low precipitation generally contain less organic matter and are light colored.

Climate functions directly in the accumulation of parent material and in the differentiation of soil horizons. Temperature and rainfall strongly influence the rate of weathering of rocks, the decomposition of minerals, the activity of microorganisms, the accumulation and decomposition of organic matter, the growth of plants, and the processes of leaching, eluviation, and illuviation.

Climate not only varies on a broad geographic scale, but also differs in short distances because of slope, exposure, and elevation. The climate in the survey area is generally subhumid with warm, relatively dry summers and cold, wet winters. Mountainous areas have cooler summers and colder winters than the valleys. Also, soils with northern aspects have cooler temperatures than those with southern aspects.

Generally, differences in annual precipitation and temperature are associated with changes in elevation. In the survey area, the most precipitation occurs in the higher mountains in the western part. In places, the yearly average precipitation is 60 inches or more. The coldest temperatures also occur in these mountains, with an average annual temperature range between 38 and 42 degrees F. Average annual rainfall in the Bonners Ferry area ranges from about 23 to 28 inches. The Kootenai

River flood plain is the warmest area, with an average annual temperature of about 47 degrees F.

Soils in the cooler, wetter parts of the soil survey area support native vegetation dominated by a dense canopy of conifers. The Caribouridge, Idamont, Jaypeak, Myrtlecreek, Pend Oreille, and Redraven soils formed under this type of climate. Soils that formed under trees have a thick litter layer and a thin dark-colored surface mineral layer. These soils have also undergone leaching of bases because of the high precipitation. The soils that formed under a warmer and drier climate have a more open tree canopy and more grass in the understory. These soils, such as those of the Elmira, McArthur, and Treble soil series, have thick, dark-colored surface layers that have a high content of humus, and the subsoil has been less leached of exchangeable bases. Because the annual dieback of grass roots is incorporated into the soils, the soils that formed under grass are higher in content of organic matter than the soils that formed under trees. On the other hand, tree litter falls on the soils that formed under trees and is not incorporated very deeply.

Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development through its effect on drainage and runoff. The topography of the survey area closely affects the local climate. The amount of precipitation and the degree of air temperature can have wide variations within short distances.

The topography of the survey area was determined mainly by geologic history. The area has four predominant geomorphic units: the Selkirk and Purcell Mountains, the Kootenai River flood plain, the North and South Benches, and the Moyie River and Deep Creek valleys.

The mountains largely owe their topography of long, winding ridges and relatively steep side slopes to tectonic processes and dissection by drainageways. Some ridgetops are broad with slopes that range from 5 to 25 percent. Other ridgetops are narrower with slopes greater than 25 percent. Because of the steep and very steep slopes, the soils mostly are well drained. Geologic erosion is active, and accelerated erosion follows logging, fires, or other disturbances. Consequently, some of the soils, such as the McArthur, Pearsoncreek, Rubycreek, and Treble series, have lost some of their thick volcanic ash mantle.

Variations in rainfall and temperature, produced largely by local relief, are pronounced over short distances within the survey area. For example, annual rainfall ranges from 23 inches at Bonners Ferry to more than 60 inches in the mountains about 12 miles away. Soil temperature and moisture vary over short distances because of slope and aspect differences. The Pend Oreille soils with north-facing slopes receive less direct sunlight, have colder soil temperatures, and retain moisture longer than the south-facing Dufort soils, which are warmer and dry out faster. Because of these differences, the plant cover on these two soils is dissimilar.

The Kootenai River flood plain is relatively flat. Because of the level topography, drainage is poor and drainage outlets are lacking. The drainage difficulties cause a seasonal high or fluctuating water table. Soils, such as the DeVoignes, Ritz, and Schnoorson series, formed on this flood plain under water-tolerant plants. Because of their poor drainage, these soils have gleyed underlying horizons and have brown and yellowish red mottles, which indicate intense reduction of iron.

The soils on the high terraces or benches are influenced by slope and aspect. The Rubson soils on the gently sloping tops and the Crash soils on the northern slopes retain moisture longer and are cooler than the Caboose and Wishbone soils on southern slopes.

Living Organisms

Living organisms are active in the formation of soils. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients in the soil, and changes in porosity and structure.

Roots, rodents, and insects penetrate the soil and alter its structure. Microorganisms, chemicals in the soil, and insects change leaves, roots, and entire plants that remain in the surface layer to humus. Fungi and algae also contribute to the decomposition of bedrock. Animals increase porosity by burrowing through the soil and leaving open channels for the movement of water and air.

Some of the soils on mountains with a southern aspect formed under an open tree canopy with grass in the understory vegetation. The abundance of fibrous roots adds much humus to the soils, and the organic matter content can be high throughout the thick, dark-colored surface layers. Microorganisms are very active in these soils, having influenced the

dark color, the structure, and the physical condition of the Elmira, McArthur, and Treble soils.

The poorly drained soils of the flood plains and valley bottoms formed under water-tolerant grasses, sedges, and forbs. Examples of these soils are the DeVoignes, Ritz, and Schnoorson series. While they were forming, drainage was poor, water was readily available, and native plants grew abundantly. These soils provide good habitat for microorganisms, which leads to decomposition of the organic matter and its incorporation into the soil. Soil bacteria also play a role in the reduction of iron and manganese in saturated soils.

Time

Change taking place in soils over a long period is called soil genesis. As a result of these changes, distinct horizons, or layers, develop in the soils. The length of time that parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree to which the soil profile has developed. The kind and arrangement of these horizons are called soil morphology. These layers are described in terms of chemistry, color, consistence, permeability, structure, texture, and thickness.

Soils are classified according to their approximate age, from young to mature. Age, or maturity, of a soil is generally indicated by the thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

The degree of horizonation in soils depends in part upon the length of time the soil has been exposed to weathering. Soils with minimal horizonation are considered young; soils with strongly expressed horizons are old; and soils with moderately differentiated horizons are intermediate in age. Generally, young soils occur in recently accumulated parent material, and old soils are in parent material that has been in place for thousands of years.

Most soils on the flood plains are young. The Farnhamton, Ritz, and Schnoorson soils formed in unconsolidated sediment that was recently deposited. These soils accumulated organic matter over time to form an A horizon.

The Frycanyon, Porthill, Rubson, and Zioncreek soils, which occur on old terraces, are considered the oldest soils in the survey area because they have the most strongly differentiated horizons. These soils

have had sufficient time for the translocation of silicate clay minerals and have developed well-expressed Bt horizons.

Soils on the mountains and foothills vary in the degree of horizonation and development. The Baldeagle, Caribouridge, Jaypeak, Katka, McArthur, Pearsoncreek, and Redraven soils, although relatively young, have had sufficient time for more weathering of soil parent material and for more chemical alteration of primary minerals. The Dufort, Highfalls, Idamont, Pend Oreille, and Treble soils are intermediate in age. They have had time for some translocation of silicate clay minerals as indicated by changes in color, texture, structure, and consistence of the Bt horizon.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, "Classification of the Soils," shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has an udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, active, frigid Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is the Porthill series. The soils in the Porthill series are fine, active, frigid Typic Hapludalfs.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area, is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.



Figure 2.—Soil profile of Crash silt loam. A Bk horizon occurs at a depth of about 4.5 feet.



Figure 4.— Soil profile of Idamont ashy silt loam.



Figure 3.—Soil profile of Dufort ashy silt loam.



Figure 5.—Soil profile of Rubson ashy silt loam. Clay bands are visible in the subsoil.

Alfic Udivitrands

Depth class: Deep (40 to 60 inches) to dense basal till

Drainage class: Well drained

Landform: Mountains, foothills, and footslopes

Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash

Slope range: 5 to 65 percent

Elevation: 2,300 to 5,000 feet

Average annual precipitation: 30 to 50 inches

Average annual air temperature: 42 to 46 degrees F

Frost-free period: 70 to 110 days

Taxonomic Class: Ashy over loamy, glassy over mixed, superactive, frigid Alfic Udivitrands

Typical Pedon

Alfic Udivitrands, in an area of Highfalls stony ashy silt loam, 35 to 65 percent slopes, bouldery, about 7 miles northwest of Naples, about 1,700 feet north and 450 feet east of the southwest corner of sec. 17, T. 61 N., R. 1 W.; 48 degrees 38 minutes 7 seconds north latitude, 116 degrees 30 minutes 7 seconds west longitude, USGS Roman Nose topographic quadrangle.

Oi—0 to 1 inch; needles, leaves, and twigs.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) stony ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine and fine tubular pores; 5 percent gravel; slightly acid (pH 6.2); abrupt wavy boundary.

Bw1—3 to 8 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; many very fine and fine tubular pores; 5 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

Bw2—8 to 17 inches; light yellowish brown (10YR 6/4) ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few coarse, common fine and medium, and many very fine roots; many very fine and common fine tubular pores; 5 percent

gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2Bt1—17 to 23 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, medium, and coarse roots; few fine and many very fine tubular pores; few faint clay films on faces of peds and lining pores; 10 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2Bt2—23 to 43 inches; light yellowish brown (2.5Y 6/4) gravelly sandy loam, olive brown (2.5Y 4/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, medium, and coarse roots; few fine and common very fine tubular and irregular pores; common faint and distinct clay films on faces of peds and lining pores; 15 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

2Cd—43 to 60 inches; pale yellow (5Y 8/2) gravelly sandy loam, olive (5Y 5/3) moist; massive; extremely hard, extremely firm, slightly sticky, slightly plastic; few fine and many very fine tubular and irregular pores; 10 percent gravel and 5 percent cobbles; slightly acid (pH 6.5).

Range in Characteristics

Average annual soil temperature: 42 to 46 degrees F

Average summer soil temperature: 47 to 53 degrees F with an O horizon

Moisture control section: Dry 15 to 45 days (August to September); moist September through July

Depth to the dense 2Cd horizon: 29 to 60 inches; predominantly 40 to 60 inches

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: Ashy silt loam or gravelly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 0 to 25 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Slightly acid to neutral

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Ashy silt loam or gravelly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 5 to 25 percent
 Cobble content: 0 to 10 percent
 Moist bulk density: .65 to .90 g/cm³
 Reaction: Slightly acid to neutral

2Bt horizons

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Gravelly sandy loam or cobbly sandy loam
 Clay content: 3 to 8 percent
 Gravel content: 10 to 30 percent
 Cobble content: 0 to 15 percent
 Reaction: Moderately acid to slightly acid

2Cd horizon

Hue: 5Y or 2.5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Texture: Gravelly sandy loam or cobbly sandy loam
 Clay content: 3 to 8 percent
 Gravel content: 10 to 30 percent
 Cobble content: 0 to 15 percent
 Moist bulk density: 1.7 to 1.8 g/cm³
 Reaction: Moderately acid to slightly acid

Andic Hapludalfs

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Terraces
 Parent material: Glaciolacustrine sediments with a thin mantle of volcanic ash
 Slope range: 0 to 8 percent
 Elevation: 2,100 to 2,700 feet
 Average annual precipitation: 25 to 30 inches
 Average annual air temperature: 42 to 45 degrees F
 Frost-free period: 100 to 135 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Andic Hapludalfs

Typical Pedon

Andic Hapludalfs, in an area of Rubson ashy silt loam, 2 to 8 percent slopes, about 4 miles south of Bonners Ferry, about 600 feet north and 1,875 feet west of the southeast corner of sec. 16, T. 61 N., R. 1 E.; 48 degrees 37 minutes 56 seconds north latitude, 116 degrees 20 minutes 17 seconds west longitude, USGS Bonners Ferry topographic quadrangle.

Oi—0 to 2 inches; needles, leaves, twigs, cones, and bark.

Oe—2 to 3 inches; partially decomposed needles, leaves, and twigs mixed with Mt. St. Helens volcanic ash.

A—3 to 4 inches; dark grayish brown (10YR 4/2) ashy silt loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; few medium and many very fine and fine roots; few medium and many very fine and fine tubular pores; neutral (pH 7.0); abrupt wavy boundary.

Bw1—4 to 9 inches; light yellowish brown (10YR 6/4) ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; few medium and many very fine and fine tubular pores; slightly acid (pH 6.5); gradual wavy boundary.

Bw2—9 to 15 inches; light yellowish brown (10YR 6/4) ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; few medium and many very fine and fine tubular pores; slightly acid (pH 6.2); gradual wavy boundary.

2Bw3—15 to 19 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; common medium and many very fine and fine tubular pores; slightly acid (pH 6.2); abrupt wavy boundary.

2Bt1—19 to 33 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few medium and coarse and common very fine and fine roots; many very fine and fine tubular and irregular pores; few faint clay films on faces of peds and lining pores; few thin lamellae 2- to 4-mm thick; slightly acid (pH 6.5); gradual wavy boundary.

2Bt2—33 to 43 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few medium and coarse and common very fine and fine roots; many very fine and fine tubular and irregular pores; few faint clay films on faces of

pedes and lining pores; common thick lamellae .25- to .5-inch thick; neutral (pH 6.8); clear wavy boundary.

2Bt3—43 to 47 inches; mixed very pale brown (10YR 7/3) and light yellowish brown (10YR 6/4) silty clay loam, brown (10YR 5/3) and dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few medium and common very fine and fine roots; few fine and common very fine tubular pores; many thick yellowish brown (10YR 5/4) lamellae .25- to 1-inch thick; slightly acid (pH 6.5); clear wavy boundary.

2Bt4—47 to 55 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few very fine, fine, and medium roots; many very fine tubular and irregular pores; few faint clay films on faces of pedes and lining pores; common thin lamellae 2- to 4-mm thick; neutral (pH 6.8); clear wavy boundary.

3C—55 to 63 inches; light yellowish brown (2.5Y 6/3) loamy very fine sand, olive brown (2.5Y 4/3) moist; massive; soft, very friable, nonsticky, nonplastic; few fine and many very fine pores; slightly alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 42 to 46 degrees F

Average summer soil temperature: 52 to 56 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Volcanic ash mantle: 8- to 13-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 to 6 dry; 2 to 4 moist

Chroma: 2 or 3 dry or moist

Texture: Ashy silt loam

Clay content: 5 to 10 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Moderately acid to neutral

Bw horizon

Value: 5 or 6 dry; 3 or 4 moist

Texture: Ashy silt loam

Clay content: 5 to 10 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Moderately acid to neutral

2Bw horizon (absent in some pedons)

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 3 or 4 dry or moist

Texture: Silt loam or very fine sandy loam

Clay content: 5 to 17 percent

Reaction: Moderately acid to neutral

2Bt horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 3, 4, or 6 dry or moist

Texture: Silt loam, silty clay loam, or very fine sandy loam

Clay content: 5 to 32 percent; averages less than 18 percent throughout control section

Lamellae: $\frac{1}{16}$ - to 2-inches thick; 10YR or 7.5YR 4/4, 4/6, 5/4 moist; clay content 16 to 25 percent

Reaction: Moderately acid to neutral

3C horizon

Chroma: 2 or 3 dry or moist

Texture: Loamy very fine sand or very fine sandy loam

Clay content: 0 to 5 percent

Reaction: Neutral to slightly alkaline

Aquic Udifluvents

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Landform: Higher positions on flood plains and valley floors

Parent material: Stratified alluvium

Slope range: 0 to 4 percent

Elevation: 1,800 to 3,000 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 120 days

Taxonomic Class: Aquic Udifluvents

Typical Pedon

Aquic Udifluvents, in an area of Seelovers-Typic

Fluvaquents-Aquic Udifluvents complex, 0 to 4 percent slopes, near the Moyie River south of Good Grief, about 1,300 feet south and 100 feet west of the northeast corner of sec. 10, T. 64 N., R. 2 E.

Oi—0 to .5 inch; grass, leaves, and twigs.

A—.5 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure;

slightly hard, friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common medium and many very fine and fine tubular pores; moderately acid (pH 6.0); clear wavy boundary.

AC—4 to 9 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; common medium and many very fine and fine roots; common fine and medium and many very fine tubular pores; moderately acid (pH 6.0); gradual wavy boundary.

C—9 to 24 inches; light brownish gray (10YR 6/2 and 2.5Y 6/2) stratified very fine sandy loam to loamy fine sand, dark grayish brown (10YR 4/2 and 2.5Y 4/2) moist; massive; slightly hard, friable, nonsticky, nonplastic; common very fine, fine, and medium roots; few fine and medium and common very fine tubular pores; moderately acid (pH 6.0); gradual wavy boundary.

Cg1—24 to 44 inches; light brownish gray (2.5Y 6/2) or variegated stratified very fine sandy loam to coarse sand, dark grayish brown (2.5YR 4/2) or variegated moist; massive to single grain; slightly hard and friable to loose, nonsticky, nonplastic; common very fine and fine roots; few fine and medium and common very fine tubular and irregular pores; few fine manganese masses; many medium and coarse prominent brown (7.5YR 5/4) redox concentrations; 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

Cg2—44 to 60 inches; variegated stratified loamy sand to very cobbly coarse sand; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine interstitial pores; many medium and coarse prominent brown (7.5YR 5/4) redox concentrations; 10 to 20 percent gravel and 0 to 35 percent cobbles; slightly acid (pH 6.5).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F
Average summer soil temperature: 56 to 60 degrees F without an O horizon

Depth to seasonal high water table: 18 to 36 inches (December to June); drained phase 36 to 48 inches (December to June)

A horizon

Clay content: 5 to 15 percent
Texture: Silt loam, very fine sandy loam, or loam
Gravel content: 0 to 10 percent
Reaction: Moderately acid to neutral

AC horizon

Clay content: 5 to 15 percent
Texture: Silt loam, very fine sandy loam, or loam
Gravel content: 0 to 10 percent
Reaction: Moderately acid to neutral

C horizon

Clay content: 0 to 10 percent
Texture: Stratified very fine sandy loam, silt loam, fine sandy loam, loamy fine sand, sandy loam, loamy sand, or sand
Gravel content: 0 to 10 percent
Reaction: Moderately acid to neutral

Cg horizons

Clay content: 0 to 10 percent
Texture: Stratified very fine sandy loam, silt loam, fine sandy loam, loamy fine sand, loamy sand, sand, or coarse sand in upper part; stratified very cobbly coarse sand, very gravelly coarse sand, cobbly loamy sand, gravelly sand, coarse sand, or sand; loamy sand in lower part
Gravel content: 5 to 55 percent
Cobble content: 0 to 35 percent
Reaction: Moderately acid to neutral

Artnoc Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Terrace escarpments

Parent material: Silty glaciolacustrine sediments

Slope range: 15 to 75 percent

Elevation: 1,800 to 2,700 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 43 to 45 degrees F

Frost-free period: 90 to 120 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Lamellic Hapludalfs

Typical Pedon

Artnoc silt loam, 35 to 75 percent slopes, about 1 mile north and .25 mile west of Naples, about 1,500 feet south and 2,000 feet west of the northeast corner of sec. 1, T. 60 N., R. 1 W.; 48 degrees 34 minutes 59 seconds north latitude, 116 degrees 24 minutes 16 seconds west longitude.

Oi—0 to 1.5 inches; needles and twigs.

Oe—1.5 to 2 inches; partly decomposed needles and twigs.

A—2 to 4 inches; light gray (2.5Y 7/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak fine

granular structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; moderately acid (pH 5.6); clear wavy boundary.

AB—4 to 8 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine pores; many very fine and fine black concretions; moderately acid (pH 6.0); clear wavy boundary.

Bt1—8 to 18 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; many very fine and fine pores; few faint clay films on faces of peds and lining pores; 25 to 50 percent of the horizon consists of $\frac{1}{16}$ to 2 inch dark yellowish brown lamellae with a total thickness of 3 inches or more that have about 10 percent more clay than the matrix; many very fine, fine, and medium black concretions; slightly acid (pH 6.2); gradual wavy boundary.

Bt2—18 to 33 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine roots; many very fine and fine pores; few faint clay films on faces of peds and lining pores; 10 to 20 percent of the horizon has $\frac{1}{16}$ to 1 inch dark yellowish brown lamellae with a total thickness of 3 inches or more that have about 10 percent more clay than the matrix; many very fine, fine, and medium black concretions; slightly acid (pH 6.4); gradual wavy boundary.

C—33 to 60 inches; light olive gray (5Y 6/2) silt loam, olive gray (5Y 5/2) moist; laminated glaciolacustrine sediments; hard, firm, slightly sticky, slightly plastic; slightly effervescent; slightly alkaline (pH 7.8).

Range in Characteristics

Average annual soil temperature: 43 to 45 degrees F

Average summer soil temperature: 52 to 55 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Thin layer of light gray volcanic ash: Between the surface organic and mineral horizons in undisturbed areas

A horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 or 4 moist

Clay content: 0 to 14 percent

Reaction: Moderately acid to neutral

AB horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3 dry or moist

Clay content: 0 to 14 percent

Reaction: Moderately acid to neutral

Bt horizons

Hue: 2.5Y or 5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3 dry or moist

Clay content: 6 to 18 percent

Lamellae: Thin and thick discontinuous and continuous dark yellowish brown or yellowish brown; $\frac{1}{16}$ - to 3-inches thick with a total thickness of 6 inches or more; occupy 10 to 80 percent of horizon; with clay content 10 to 16 percent more than in matrix

Reaction: Slightly acid to neutral

C horizon

Value: 6 or 7 dry; 4 or 5 moist

Clay content: 0 to 14 percent

Effervescence: None to strongly

Calcium carbonate equivalent: 0 to 5 percent

Reaction: Neutral to moderately alkaline

Baldeagle Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: High-elevation mountain slopes

Parent material: Weathered material derived from granite and gneiss bedrock with a thick mantle of volcanic ash

Slope range: 35 to 75 percent

Elevation: 4,800 to 6,000 feet

Average annual precipitation: 45 to 60 inches

Average annual air temperature: 38 to 42 degrees F

Frost-free period: 30 to 60 days

Taxonomic Class: Medial over loamy-skeletal, glassy over mixed, superactive Typic Haplocryands

Typical Pedon

Baldeagle gravelly medial silt loam, 35 to 75 percent slopes, about 5.5 miles east of Naples, about 900 feet south and 2,200 feet west of the northeast corner of sec. 13, T. 60 N., R. 1 E.; 48 degrees 33 minutes 8 seconds north latitude; 16 degrees, 16 minutes, 21 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, twigs, cones, bark, and moss.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; dark grayish brown (10YR 4/2) gravelly medial silt loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; few fine and many very fine tubular pores; 15 percent gravel; slightly acid (pH 6.3); abrupt wavy boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/4) gravelly medial silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; few fine and many very fine tubular pores; 15 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bw2—7 to 14 inches; light yellowish brown (10YR 6/4) gravelly medial silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; few fine and many very fine tubular pores; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.3); gradual wavy boundary.

Bw3—14 to 20 inches; very pale brown (10YR 7/4) cobbly medial silt loam, yellowish brown (10YR 5/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and common very fine roots; few fine and many very fine tubular pores; 15 percent gravel and 10 percent cobbles; slightly acid (pH 6.3); clear wavy boundary.

2BC—20 to 36 inches; light yellowish brown (2.5Y 6/4) extremely stony sandy loam, olive brown (2.5Y 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine tubular and irregular pores; 15 percent gravel, 10 percent cobbles, and 50 percent stones; slightly acid (pH 6.3); gradual wavy boundary.

2C—36 to 60 inches; light yellowish brown (2.5Y 6/3) extremely stony sandy loam, olive brown (2.5Y 4/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine irregular pores; 15 percent

gravel, 20 percent cobbles, and 50 percent stones; strongly acid (pH 5.4).

Range in Characteristics

Average annual soil temperature: 39 to 42 degrees F

Average summer soil temperature: 43 to 45 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (mid August to September); moist September through July

Surface stones: 0 to 3 percent

Volcanic ash mantle: 14- to 18-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 80 to 100 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2 dry or moist

Texture: Gravelly medial silt loam or medial silt loam

Clay content: 3 to 9 percent

Gravel content: 10 to 25 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Moderately acid to slightly acid

Bw horizons

Value: 5 to 7 dry; 3 to 5 moist

Texture: Gravelly medial silt loam, medial silt loam, or cobbly medial silt loam

Clay content: 3 to 9 percent

Gravel content: 5 to 20 percent

Cobble content: 0 to 15 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Slightly acid to neutral

2BC horizon

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Extremely stony sandy loam, extremely stony coarse sandy loam, very gravelly sandy loam, or very cobbly sandy loam

Clay content: 3 to 9 percent

Gravel content: 15 to 45 percent

Cobble content: 5 to 15 percent

Stone content: 0 to 50 percent

Reaction: Strongly acid to slightly acid

2C horizon

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 or 3 dry or moist

Texture: Extremely stony sandy loam, extremely stony coarse sandy loam, extremely stony loamy sand, extremely gravelly sandy loam, or extremely gravelly loamy coarse sand

Clay content: 3 to 9 percent
 Gravel content: 15 to 45 percent
 Cobble content: 10 to 35 percent
 Stone content: 10 to 50 percent
 Reaction: Very strongly acid to moderately acid

Bane Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Somewhat excessively drained
 Landform: Alluvial fans
 Parent material: Granitic alluvium
 Slope range: 2 to 8 percent
 Elevation: 1,750 to 2,000 feet
 Average annual precipitation: 25 to 30 inches
 Average annual air temperature: 42 to 44 degrees F
 Frost-free period: 90 to 110 days

Taxonomic Class: Sandy, mixed, frigid Typic
 Udifluvents

Typical Pedon

Bane loamy fine sand, 2 to 8 percent slopes, near the headquarters buildings of the Kootenai National Wildlife Refuge, about 1,700 feet north and 800 feet east of the southwest corner of sec. 24, T. 62 N., R. 1 W.; 48 degrees 42 minutes 28 seconds north latitude; 116 degrees 24 minutes 50 seconds west longitude.

Oi—0 to 1 inch; needles, twigs, leaves, and grass.

A—1 to 6 inches; very dark gray (10YR 3/1) loamy fine sand, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine, fine, medium, and coarse roots; many fine pores; 5 percent fine gravel; neutral (pH 6.6); clear wavy boundary.

C1—6 to 25 inches; very pale brown (10YR 8/2) gravelly sand, light brownish gray (10YR 6/2) moist; single grain; loose, nonsticky, nonplastic; few fine, medium, and coarse roots; many pores; 30 percent fine gravel; neutral (pH 6.8); abrupt wavy boundary.

2C2—25 to 39 inches; very pale brown (10YR 8/2) fine sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; few roots; many pores; 10 percent gravel; neutral (pH 6.8); abrupt wavy boundary.

3Ab—39 to 43 inches; grayish brown (10YR 5/2) gravelly loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; few roots; many pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

4C3—43 to 60 inches; light brownish gray (10YR 6/2) very gravelly sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; very porous; 60 percent gravel; neutral (pH 6.9).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F
 Average summer soil temperature: 50 to 55 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Surface stones: 0 to 15 percent

A horizon

Hue: 10YR or 2.5Y
 Value: 3 to 6 dry; 2 to 4 moist
 Chroma: 1 or 2 dry or moist
 Clay content: 5 to 10 percent
 Gravel content: 0 to 10 percent
 Reaction: Neutral or slightly acid

C1 horizon

Hue: 10YR or 2.5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Clay content: 2 to 7 percent
 Texture: Gravelly sand, sand, loamy sand, or very gravelly sand
 Gravel content: Fine; 10 to 50 percent (averages less than 35 percent)
 Reaction: Neutral or slightly acid

2C2 horizon

Hue: 10YR or 2.5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Clay content: 2 to 5 percent
 Texture: Fine sand, loamy fine sand, or gravelly loamy fine sand
 Gravel content: 5 to 15 percent
 Reaction: Neutral or slightly acid

3Ab horizon (absent in some pedons)

Texture: Gravelly loamy fine sand or loamy fine sand
 Clay content: 5 to 10 percent
 Gravel content: 10 to 25 percent
 Reaction: Neutral or slightly acid

4C3 horizon

Hue: 10YR or 2.5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Texture: Very gravelly sand, extremely gravelly sand, or very gravelly coarse sand
 Clay content: 0 to 2 percent

Gravel content: 50 to 85 percent
 Cobble content: 0 to 10 percent
 Reaction: Neutral or slightly acid

Caboose Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Terrace escarpments
 Parent material: Calcareous glaciolacustrine sediments
 Slope range: 15 to 75 percent
 Elevation: 1,800 to 2,700 feet
 Average annual precipitation: 25 to 30 inches
 Average annual air temperature: 43 to 45 degrees F
 Frost-free period: 100 to 130 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Lamellic Haploxeralfs

Typical Pedon

Caboose very fine sandy loam, in an area of Wishbone-Caboose complex, 35 to 75 percent slopes, about 1.75 miles south of the Bonners Ferry Forest Ranger Station on U.S. Highway 95, about 1,320 feet north and 1,320 feet east of the southwest corner of sec. 9, T. 61 N., R. 1 E.; 48 degrees 38 minutes 55 seconds north latitude; 116 degrees 20 minutes 49 seconds west longitude.

Oi—0 to .5 inch; needles, twigs, and grass.

Oe—.5 to 1 inch; partly decomposed needles, twigs, and grass.

A—1 to 5 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak very fine and fine granular structure; hard, friable, slightly sticky, slightly plastic; many very fine to coarse roots; many very fine and fine and few medium pores; slightly acid (pH 6.2); clear smooth boundary.

AB1—5 to 9 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many very fine to coarse roots; many very fine to medium pores; many very fine black concretions; slightly acid (pH 6.5); clear wavy boundary.

AB2—9 to 21 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common very fine to coarse roots; few medium and many very fine pores; many very

fine black concretions; neutral (pH 6.8); clear wavy boundary.

Bt1—21 to 35 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common very fine to coarse roots; few medium and many very fine pores; few faint clay films on faces of peds and lining pores; many very fine and fine black concretions; 50 to 70 percent of the horizon consists of dark yellowish brown lamellae that range in thickness from 1/16 to 3 inches with a total thickness of 6 inches or more, and have about 10 percent more clay than the matrix; neutral (pH 6.8); clear wavy boundary.

Bt2—35 to 57 inches; pale olive (5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and medium roots; common very fine pores; few faint clay films on faces of peds and lining pores; 10 to 25 percent of the horizon consists of pale brown lamellae that are 1/16- to 2-inches thick and have about 10 percent more clay than the matrix; many very fine and fine black concretions; neutral (pH 7.3); abrupt wavy boundary.

Bk—57 to 60 inches; light yellowish brown (2.5Y 6/3) very fine sandy loam, olive brown (2.5Y 4/3) moist; weak thick platy; slightly hard, friable, slightly sticky, slightly plastic; strongly effervescent; few fine masses of lime; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 45 to 47 degrees F

Average summer soil temperature: 55 to 59 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Thin discontinuous light gray volcanic ash layer:
 Between the organic and upper mineral layer in undisturbed areas and also a thin dark grayish brown A horizon about 1-inch thick

A horizon

Hue: 2.5Y or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Texture: Very fine sandy loam or silt loam

Clay content: 4 to 14 percent

Reaction: Moderately acid to neutral

AB horizons

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist
 Texture: Very fine sandy loam or silt loam
 Clay content: 4 to 14 percent
 Reaction: Slightly acid or neutral

Bt horizons

Hue: 2.5Y or 5Y
 Value: 5 to 7 dry; 4 or 5 moist
 Chroma: 2 or 3 dry or moist
 Texture: Very fine sandy loam or silt loam
 Clay content: 8 to 18 percent
 Lamellae: Thin and thick; discontinuous and continuous
 Reaction: Slightly acid to slightly alkaline

Bk horizon

Hue: 2.5Y or 5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Texture: Very fine sandy loam or silt loam
 Clay content: 4 to 14 percent
 Effervescence: Strongly or violently
 Calcium carbonate concentrations: Few to many, fine to coarse seams and masses
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: Moderately alkaline

C horizon (present in some pedons)

Hue: 2.5Y or 5Y
 Value: 5 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Texture: Very fine sandy loam or silt loam
 Clay content: 4 to 14 percent
 Effervescence: Slightly to strongly
 Calcium carbonate equivalent: 5 to 10 percent
 Reaction: Moderately alkaline

Caribouridge Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Mountains and hills
 Parent material: Glacial till and outwash with a thick mantle of volcanic ash
 Slope range: 0 to 65 percent
 Elevation: 2,400 to 5,000 feet
 Average annual precipitation: 30 to 50 inches
 Average annual air temperature: 42 to 45 degrees F
 Frost-free period: 70 to 100 days

Taxonomic Class: Ashy over sandy or sandy-skeletal, glassy over mixed, frigid Typic Udivitrands

Typical Pedon

Caribouridge ashy silt loam, 15 to 35 percent slopes, about 4.25 miles west of Naples, about 2,000 feet south and 800 feet west of the northeast corner of sec. 8, T. 60 N., R. 1 W.; 48 degrees 34 minutes 15 seconds north latitude, 116 degrees 28 minutes 59 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, twigs, bark, and cones.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; slightly acid (pH 6.5); abrupt wavy boundary.

Bw1—3 to 9 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; few fine and many very fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bw2—9 to 18 inches; light yellowish brown (10YR 6/4) ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and common very fine roots; few fine and many very fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2BC—18 to 23 inches; pale yellow (2.5Y 7/4) very cobbly loamy coarse sand, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium and common very fine roots; few fine and common very fine tubular and irregular pores; few very fine mica flakes; 20 percent gravel and 35 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

2C1—23 to 44 inches; pale yellow (2.5Y 7/4) extremely cobbly coarse sand, light olive brown (2.5Y 5/4) moist; single grain; loose, nonsticky, nonplastic; few fine and medium roots; many very fine and fine irregular pores; few very fine mica flakes; 35 percent gravel and 40 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.

2C2—44 to 60 inches; light yellowish brown (2.5Y 6/4) extremely cobbly coarse sand, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky, nonplastic; few fine and medium roots; many very fine and fine irregular pores; few very fine mica flakes; 25 percent gravel, 40 percent cobbles, and 5 percent stones; slightly acid (pH 6.4).

Range in Characteristics

Average annual soil temperature: 42 to 46 degrees F
Average summer soil temperature: 47 to 53 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Surface boulders: 0 to 3 percent

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Texture: Ashy silt loam, ashy loam, or gravelly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 0 to 25 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Strongly acid to slightly acid

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Texture: Ashy silt loam, ashy loam, gravelly ashy silt loam, or cobbly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 0 to 20 percent

Cobble content: 0 to 15 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Slightly acid to neutral

2BC horizon

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Texture: Very cobbly loamy coarse sand, very gravelly loamy sand, or very gravelly sandy loam

Clay content: 2 to 8 percent

Gravel content: 15 to 35 percent

Cobble content: 0 to 35 percent

Reaction: Slightly acid to neutral

2C horizons

Hue: 2.5Y, 10YR, or variegated

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly coarse sand, very gravelly loamy sand, or very cobbly loamy sand

Clay content: 0 to 3 percent

Gravel content: 15 to 45 percent

Cobble content: 5 to 40 percent

Stone content: 0 to 15 percent

Reaction: Moderately acid to neutral

Crash Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Terrace escarpments

Parent material: Silty calcareous glaciolacustrine sediments

Slope range: 35 to 75 percent

Elevation: 1,800 to 2,700 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Lamellic Hapludalfs

Typical Pedon

Crash silt loam, 35 to 75 percent slopes, about 2 miles south of the Bonners Ferry Forest Ranger Station east of U.S. Highway 95, about 100 feet north and 1,580 feet east of the southwest corner of sec. 9, T. 61 N., R. 1 E.; 48 degrees 38 minutes 43 seconds north latitude, 116 degrees, 21 minutes, 00 seconds west longitude (fig. 2).

Oi—0 to 1 inch; needles, twigs, and limbs.

Oe—1 to 2 inches; partly decomposed needles, twigs, and limbs.

A1—2 to 3 inches; light gray (5Y 7/1) silt loam, gray (5Y 5/1) moist; moderate fine granular structure; soft, friable, nonsticky, nonplastic; many very fine roots; many fine pores; slightly acid (pH 6.3); abrupt broken boundary.

A2—3 to 5 inches; light gray (5Y 7/1) silt loam, gray (5Y 5/1) moist; weak very thin platy structure parting to moderate very fine granular; soft, friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; few fine and many very fine pores; many fine black concretions; neutral (pH 6.6); abrupt smooth boundary.

AB—5 to 9 inches; light olive gray (5Y 6/2) silt loam, olive gray (5Y 5/2) moist; moderate thin platy

structure; slightly hard, friable, slightly sticky, slightly plastic; few coarse and many very fine and medium roots; few fine and common very fine pores; many fine black concretions; neutral (pH 6.7); clear wavy boundary.

Bt1—9 to 13 inches; light gray (5Y 7/2) silt loam, light olive gray (5Y 6/2) moist; weak thin and medium platy structure; slightly hard, firm, slightly sticky, slightly plastic; many very fine, fine, and medium roots; few fine and common very fine pores; few faint clay films on faces of peds and lining pores; 50 to 70 percent of the horizon consists of dark yellowish brown lamellae $\frac{1}{8}$ - to $\frac{1}{2}$ -inch thick with a total thickness of 2 inches that have about 10 percent more clay than the matrix; few very fine black concretions; neutral (pH 6.8); clear wavy boundary.

Bt2—13 to 20 inches; light gray (5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; moderate medium and very thick platy structure; slightly hard, firm, slightly sticky, slightly plastic; few medium and many very fine and fine roots; few fine and many very fine pores; few faint clay films on faces of peds and lining pores; 50 to 70 percent of the horizon consists of dark yellowish brown lamellae $\frac{1}{8}$ - to $\frac{1}{2}$ -inch thick with a total thickness of 4 inches that have about 10 percent more clay than the matrix; few very fine black concretions; slightly alkaline (pH 7.6); clear wavy boundary.

Bt3—20 to 29 inches; light olive gray (5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate thick platy structure; slightly hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine pores; few faint clay films on faces of peds and lining pores; 5 to 20 percent of horizon has dark yellowish brown lamellae $\frac{1}{8}$ - to $\frac{1}{4}$ -inch thick that have about 10 percent more clay than the matrix; few very fine black concretions; slightly alkaline (pH 7.8); gradual wavy boundary.

Bk—29 to 60 inches; light olive gray (5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate thick platy structure; very hard, very firm, slightly sticky, slightly plastic; violently effervescent; distinct lime veins and masses between plates; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 42 to 45 degrees F
Average summer soil temperature: 49 to 52 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Thin light gray volcanic ash layer: Between the O horizon and upper mineral layer in undisturbed areas

A horizons

Hue: 5Y, 2.5Y, or 10YR
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 1 or 2 dry or moist
Clay content: 0 to 10 percent
Reaction: Slightly acid to neutral

AB horizon

Hue: 5Y, 2.5Y, or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Clay content: 0 to 10 percent
Reaction: Slightly acid to neutral

Bt horizons

Hue: 5Y or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3 dry or moist
Clay content: 8 to 18 percent
Lamellae: Thin and thick; discontinuous and continuous; $\frac{1}{8}$ - to 2-inches thick
Reaction: Neutral to slightly alkaline

Bk horizon

Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3 dry or moist
Texture: Silt loam or silt
Clay content: 2 to 12 percent
Effervescence: Strongly or violently; distinct or prominent lime veins and masses
Calcium carbonate equivalent: 10 to 25 percent
Reaction: Moderately alkaline

DeVoignes Series

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Landform: Depressions and swales on flood plains, drainageways, and valley floors
Parent material: Mixed alluvium stratified with organic layers in the upper part
Slope range: 0 to 2 percent
Elevation: 1,750 to 2,800 feet
Average annual precipitation: 23 to 30 inches
Average annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 130 days

Taxonomic Class: Fine-silty, mixed, active, nonacid, frigid Histic Humaquepts

Typical Pedon

DeVoignes mucky silt loam, in an area of Schnoorson-DeVoignes complex, protected, drained,

0 to 2 percent slopes, in the University of Idaho experimental plots west of Allens Spur, about 1,820 feet north and 100 feet west of the southeast corner of sec. 7, T. 62 N., R. 1 E.; 48 degrees 44 minutes 13 seconds north latitude; 116 degrees 22 minutes 26 seconds west longitude.

Ap—0 to 9 inches; light gray (10YR 6/1 and 7/1) mucky silt loam, dark gray (10YR 4/1) moist; weak coarse subangular blocky structure parting to weak fine granular; soft, friable, slightly sticky, slightly plastic; many fine roots; many very fine pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

Oa/C—9 to 19 inches; dark gray (10YR 4/1) muck, black (10YR 2/1) moist, with thin layers of light gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; massive; hard, firm, slightly sticky, slightly plastic; many fine roots; many fine pores; moderately acid (pH 5.9); abrupt smooth boundary.

Oa/Cg—19 to 24 inches; alternate thin layers of muck and silty clay loam; muck part is dark gray (10YR 4/1), black (10YR 2/1) and very dark grayish brown (10YR 3/2) moist; silty clay loam part is light gray (10YR 6/1), dark gray (10YR 4/1) moist; weak medium platy and weak coarse prismatic structure; hard, friable, slightly sticky, slightly plastic; many very fine pores; many medium faint light yellowish brown (10YR 6/4) redox concentrations; neutral (pH 7.0); abrupt wavy boundary.

2Cg1—24 to 28 inches; gray (5Y 6/1) silty clay loam, dark gray (2.5Y 4/1) moist; weak very coarse prismatic structure; very hard, firm, moderately sticky, moderately plastic; many fine to coarse pores and root channels with organic staining; many medium distinct dark brown (7.5YR 3/4) moist redox concentrations; many snail shells; strongly effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

2Cg2—28 to 41 inches; gray (5Y 6/1) silty clay loam, dark gray (5Y 4/1) moist; weak very coarse prismatic structure; very hard, firm, moderately sticky, moderately plastic; many fine and medium tubular pores; common prominent reddish brown (5YR 4/4) moist redox concentrations; noneffervescent; slightly alkaline (pH 7.5); clear smooth boundary.

2Cg3—41 to 65 inches; light gray (5Y 7/1) stratified silty clay loam and silty clay, gray (5Y 5/1) moist; massive; very hard, firm, moderately sticky, moderately plastic; many fine tubular pores;

common faint and prominent fine and coarse light olive brown (2.5Y 5/4) and reddish brown (5YR 4/4) moist redox concentrations; noneffervescent in upper part and strongly effervescent in lower part; slightly alkaline (pH 7.5).

Range in Characteristics

Average annual soil temperature: 45 to 47 degrees F

Average summer soil temperature: 59 to 63 degrees F

Depth to seasonal high water table: 0 to 18 inches

December to July in undrained areas; 18 to

36 inches December to July in drained areas

Snail shells: In layers or scattered throughout the profile

Cracks: 1/2- to 2-inches wide to a depth of 36 inches when dry in summer

Ap horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Texture: Mucky silt loam or silt loam

Clay content: 12 to 26 percent

Effervescence: None to strongly

Calcium carbonate equivalent: 0 to 15 percent

Reaction: Neutral to moderately alkaline

Oa/C horizon

Hue: 10YR or 2.5Y

Texture: Stratified muck, sapric material, silty clay loam, or silt loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 0 to 5 percent

Reaction: Moderately acid to neutral

Oa/Cg horizon

Hue: 10YR or 2.5Y

Texture: Stratified muck, sapric material, silty clay loam, or silt loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 0 to 5 percent

Reaction: Slightly acid to slightly alkaline

2Cg horizons

Hue: 2.5Y or 5Y; 5G or 5B lower part in some pedons

Value: 6 or 7 dry; 4 or 5 moist

Redox concentrations: Chroma 4 to 6 dry or moist

Texture: Silty clay loam or stratified silty clay loam, silt loam, or silty clay

Clay content: 26 to 45 percent

Calcium carbonate equivalent: 0 to 20 percent

Reaction: Neutral to moderately alkaline

Dodgecreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Outwash terraces

Parent material: Sandy glacial outwash with a thin mantle of volcanic ash

Slope range: 2 to 12 percent

Elevation: 3,000 to 4,900 feet

Average annual precipitation: 35 to 45 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Sandy, mixed, frigid Andic
Dystrudepts

Typical Pedon

Dodgecreek ashy silt loam, 2 to 12 percent slopes, about 5 miles northwest of Naples, about 250 feet south and 250 feet west of the northeast corner of sec. 32, T. 61 N., R. 1 W.; 48 degrees 36 minutes 07 seconds north latitude, 116 degrees 28 minutes 54 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, twigs, and cones.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helen's volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, slightly plastic; few medium and coarse, common fine, and many very fine roots; many very fine tubular pores; slightly acid (pH 6.5); abrupt wavy boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; neutral (pH 6.8); clear wavy boundary.

Bw2—7 to 10 inches; light yellowish brown (10YR 6/4) ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and common very fine roots; many very fine tubular pores; neutral (pH 6.8); clear wavy boundary.

2BC1—10 to 14 inches; very pale brown (10YR 7/4) sandy loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine,

medium, and coarse and common very fine roots; common very fine tubular and irregular pores; 5 percent fine gravel; neutral (pH 6.6); clear wavy boundary.

2BC2—14 to 19 inches; mixed very pale brown (10YR 7/4) and light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; common very fine tubular and irregular pores; 5 percent fine gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2C1—19 to 47 inches; mixed pale yellow (2.5Y 8/3) and very pale brown (10YR 7/4) coarse sand, pale yellow (2.5Y 7/3) and light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine irregular pores; 5 percent fine and 5 percent medium and coarse gravel; slightly acid (pH 6.2); gradual wavy boundary.

2C2—47 to 62 inches; white (2.5Y 8/2) coarse sand, light gray (2.5Y 7/2) moist; single grain; loose, nonsticky, nonplastic; many very fine irregular pores; one very thin lamellae; 5 percent fine gravel; slightly acid (pH 6.2).

Range in Characteristics

Average annual soil temperature: 43 to 45 degrees F

Average summer soil temperature: 48 to 52 degrees F with an O horizon

Moisture control section: Dry 25 to 35 days (August to September); moist mid September through July

Depth to sandy material: 10 to 22 inches

Volcanic ash mantle: 7- to 13-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Chroma: 2 or 3 dry or moist

Texture: Ashy silt loam or ashy loam

Clay content: 3 to 8 percent

Gravel content: 0 to 5 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Moderately acid to slightly acid

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Ashy silt loam or ashy loam

Clay content: 2 to 8 percent

Gravel content: 0 to 5 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Slightly acid to neutral

2BC horizons

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 to 6 moist
 Chroma: 3, 4, or 6 dry or moist
 Texture: Sandy loam, loamy sand, or gravelly loamy sand
 Clay content: 2 to 5 percent
 Gravel content: 0 to 25 percent
 Reaction: Slightly acid to neutral

2Bw horizon (present in some pedons)

Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry; 4 or 6 moist
 Texture: Sandy loam, loamy fine sand, or fine sandy loam
 Gravel content: 0 to 10 percent

2Bt horizon (present in some pedons)

Gravel content: 0 to 10 percent
 Lamellae: .1- to .5-inch thick; few to common

2C horizons

Hue: 10YR, 2.5Y, or variegated
 Value: 6 to 8 dry; 4 to 7 moist
 Chroma: 2 to 4 dry or moist
 Texture: Coarse sand, sand, gravelly coarse sand, fine gravelly coarse sand, loamy fine sand, fine sand, or gravelly loamy coarse sand; very gravelly coarse sand in lower part of some pedons
 Clay content: 0 to 3 percent
 Gravel content: 0 to 25 percent
 Cobble content: 0 to 10 percent
 Reaction: Moderately acid to slightly acid

Dufort Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Mountains and hills
 Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash
 Slope range: 5 to 65 percent
 Elevation: 1,800 to 3,800 feet
 Average annual precipitation: 25 to 37 inches
 Average annual air temperature: 44 to 46 degrees F
 Frost-free period: 90 to 120 days

Taxonomic Class: Ashy over loamy-skeletal, glassy over mixed, superactive, frigid Alfic Vitrixerands

Typical Pedon

Dufort ashy silt loam, 15 to 35 percent slopes, about 3.7 miles southeast of Naples, about 250 feet

north and 2,250 feet east of the southwest corner of sec. 15, T. 60 N., R. 1 E (fig. 3).

Oi—0 to 1.5 inches; needles, leaves, twigs, cones, and bark.

Oe—1.5 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; dark grayish brown (10YR 4/2) ashy silt loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 10 percent gravel; neutral (pH 6.8); abrupt wavy boundary.

Bw1—3 to 9 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few medium and coarse and many very fine and fine roots; common medium and many very fine and fine tubular pores; 10 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

Bw2—9 to 18 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few medium and coarse and many very fine and fine roots; common medium and many very fine and fine tubular pores; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

2Bt1—18 to 25 inches; light yellowish brown (2.5Y 6/3) very gravelly sandy loam, olive brown (2.5Y 4/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine and many very fine tubular pores; common faint clay films on faces of pedis and in pores; 30 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2Bt2—25 to 36 inches; light yellowish brown (2.5Y 6/3) very cobbly sandy loam, olive brown (2.5Y 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine and many very fine tubular pores; common faint clay films on faces of pedis and in pores; 30 percent gravel and 30 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2Bt3—36 to 47 inches; light yellowish brown (2.5Y 6/3) very cobbly sandy loam, olive brown (2.5Y 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots;

few fine and common very fine tubular pores; common faint clay films on faces of peds and in pores; 25 percent gravel and 35 percent cobbles; moderately acid (pH 5.8); gradual wavy boundary.

- 2Bt4—47 to 52 inches; pale yellow (2.5Y 7/3) very cobbly fine sandy loam, light olive brown (2.5Y 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds and in pores; 25 percent gravel and 15 percent cobbles; moderately acid (pH 5.6); clear wavy boundary.
- 2C—52 to 60 inches; pale yellow (2.5Y 7/3) extremely stony sandy loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine tubular and irregular pores; 10 percent gravel, 20 percent cobbles, and 50 percent stones and boulders; moderately acid (pH 5.6).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F
Average summer soil temperature: 52 to 55 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Surface stones and boulders: 0 to 3 percent

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3 dry or moist

Texture: Ashy silt loam, ashy loam, gravelly ashy silt loam, or gravelly ashy loam

Clay content: 3 to 8 percent

Gravel content: 0 to 25 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Slightly acid to neutral

Bw horizons

Hue: 10YR or 7.5YR

Value: 5 or 6 dry; 3 or 4 moist

Texture: Ashy silt loam, gravelly ashy silt loam, or gravelly ashy loam

Clay content: 3 to 8 percent

Gravel content: 0 to 25 percent

Cobble content: 0 to 15 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Moderately acid to neutral

2Bt horizons

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, very, gravelly fine sandy loam, very cobbly fine sandy loam, very gravelly loam, or very cobbly loam

Clay content: 3 to 10 percent

Gravel content: 15 to 35 percent

Cobble content: 5 to 35 percent

Reaction: Moderately acid to neutral

2C horizon (absent in some pedons)

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 to 4 dry or moist

Texture: Very stony sandy loam, extremely bouldery sandy loam, extremely stony sandy loam, very gravelly sandy loam, very gravelly fine sandy loam, or very cobbly sandy loam

Clay content: 3 to 10 percent

Gravel content: 10 to 40 percent

Cobble content: 5 to 30 percent

Stone and boulder content: 10 to 50 percent

Reaction: Moderately acid to neutral

Elmira Series

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Landform: Undulating to hilly dunes of glaciolacustrine terraces

Parent material: Sandy glaciolacustrine sediments or shoreline deposits with very minor amounts of loess and volcanic ash in the surface layers

Slope range: 0 to 35 percent

Elevation: 1,800 to 2,500 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 43 to 47 degrees F

Frost-free period: 110 to 140 days

Taxonomic Class: Mixed, frigid Lamellic

Xeropsamments

Typical Pedon

Elmira loamy fine sand, in an area of Selle-Elmira complex, 0 to 20 percent slopes, about 3 miles southwest of Naples, about 2,550 feet north and 1,200 feet west of the southeast corner of sec. 23, T. 60 N., R. 1 W.

Oi—0 to 1.5 inches; slightly decomposed needles and twigs.

Oe—1.5 to 2 inches; partly decomposed needles and twigs.

A—2 to 6 inches; yellowish brown (10YR 5/4) loamy fine sand, very dark brown (7.5YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; few coarse and many very fine and fine roots; many fine pores; moderately acid (pH 5.9); clear wavy boundary.

Bw1—6 to 14 inches; light yellowish brown (10YR 6/4) loamy fine sand, dark brown (7.5YR 3/3) moist; moderate coarse granular structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine and fine roots; many fine pores; slightly acid (pH 6.1); clear wavy boundary.

Bw2—14 to 26 inches; pale brown (10YR 6/3) fine sand, dark brown (10YR 4/3) moist; weak coarse granular structure; soft, very friable, nonsticky, nonplastic; few very fine, fine, and coarse roots; many fine pores; slightly acid (pH 6.1); diffuse wavy boundary.

E and Bt—26 to 60 inches; light gray (10YR 7/2) fine sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; few fine roots; many fine pores; few thin wavy discontinuous lamellae; many medium distinct dark brown (7.5YR 4/4) moist mottles in random irregular shaped spots; slightly acid (pH 6.1).

Range in Characteristics

Moisture control section: Usually dry for 45 to 60 consecutive days (August to September); moist October through July

Average annual soil temperature: 43 to 47 degrees F

Average summer soil temperature: 52 to 55 degrees F with an O horizon; 59 to 65 degrees F without an O horizon

Coarse fragments: Less than 5 percent throughout

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 to 4 moist or dry

Texture: Loamy sand, loamy fine sand, or fine sandy loam

Clay content: 0 to 4 percent

Reaction: Moderately acid to neutral

Bw horizons

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3 or 4 dry or moist

Texture: Loamy sand, loamy fine sand, or fine sand

Clay content: 0 to 4 percent

Reaction: Moderately acid to neutral

E and Bt horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 to 4 moist or dry

Lamellae: Few to numerous wavy discontinuous

¹/₁₆- to ¹/₄-inch thick 10YR 5/3, 10YR 5/4, 10YR 5/6 dry clay bands

Texture: Loamy sand, loamy fine sand, fine sand, or sand

Clay content: 0 to 4 percent

Reaction: Moderately acid to neutral

C horizon present in some pedons

Texture: Loamy sand, fine sand, or sand

Clay content: 0 to 4 percent

Reaction: Moderately acid to neutral

Farnhamton Series

Depth class: Very deep (more than 60 inches)

Drainage class: Moderately well drained

Landform: Natural levees on flood plains

Parent material: Calcareous alluvium

Slope range: 0 to 5 percent

Elevation: 1,750 to 1,800 feet

Average annual precipitation: 23 to 28 inches

Average annual air temperature: 45 to 47 degrees F

Frost-free period: 120 to 140 days

Taxonomic Class: Coarse-silty, mixed, superactive, calcareous, frigid Oxyaquic Xerofluvents

Typical Pedon

Farnhamton silt loam, protected, drained, 2 to 5 percent slopes, about 2 miles west of Bonners Ferry along the south bank of the Kootenai River, about 300 feet south and 2,160 feet east of the northwest corner of sec. 29, T. 62 N., R. 1 E.; 48 degrees 42 minutes 07 seconds north latitude, 116 degrees 21 minutes 50 seconds west longitude.

Ap—0 to 7 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many very fine pores; strongly effervescent; slightly alkaline (pH 7.4); abrupt wavy boundary.

AC—7 to 11 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; weak very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many very fine pores; few faint brown (7.5YR 4/4) moist redox concentrations; discontinuous layer of dark brown (7.5YR 3/2)

moist material $\frac{1}{2}$ - to 1 $\frac{1}{2}$ -inches thick; strongly effervescent; slightly alkaline (pH 7.5); abrupt wavy boundary.

- C1—11 to 22 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many very fine and fine pores; few faint brown (7.5YR 4/3) moist redox concentrations; dark brown (7.5YR 3/2) moist band $\frac{1}{8}$ - to 1-inch thick; strongly effervescent; slightly alkaline (pH 7.6); abrupt wavy boundary.
- C2—22 to 40 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine roots; many fine pores; few faint redox features; thin discontinuous layer of dark brown (7.5YR 3/2) moist material; strongly effervescent; moderately alkaline (pH 7.9); clear wavy boundary.
- C3—40 to 60 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; many fine pores; strongly effervescent; moderately alkaline (pH 7.9).

Range in Characteristics

Average annual soil temperature: 45 to 47 degrees F
Average summer soil temperature: 59 to 63 degrees F

Depth to seasonal high water table: 48 to 60 inches drained (December to May); 36 to 48 inches undrained (December to May)

Snail shells: Present in many pedons

Ap horizon

Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 4 or 5 moist
Texture: Silt loam, loam, or very fine sandy loam
Clay content: 8 to 18 percent
Reaction: Neutral to moderately alkaline

AC horizon

Hue: 2.5Y or 10YR
Texture: Silt loam, loam, or very fine sandy loam
Clay content: 8 to 18 percent
Reaction: Neutral to moderately alkaline

C horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 2 or 3 dry or moist
Redox features: None to common; hue 10YR or 7.5YR
Texture: Silt loam or very fine sandy loam; some pedons stratified with thin layers of loamy very

fine sand, fine sandy loam, sandy loam, or loam

Clay content: 8 to 18 percent

Effervescence: Strongly to violently

Calcium carbonate equivalent: 10 to 20 percent

Thin discontinuous dark brown layers: Absent in some pedons

Reaction: Neutral to moderately alkaline

Flemingcreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Terrace escarpments

Parent material: Glaciolacustrine sediments

Slope range: 15 to 65 percent

Elevation: 1,800 to 2,400 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 43 to 45 degrees F

Frost-free period: 100 to 130 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Lamellic Haploxeralfs

Typical Pedon

Flemingcreek silt loam, 35 to 65 percent slopes, about 5.5 miles northwest of Bonners Ferry, about 1,300 feet south and 2,550 feet west of the northeast corner of sec. 28, T. 63 N., R. 1 E.; 48 degrees 47 minutes 9 seconds north latitude, 116 degrees 20 minutes 24 seconds west longitude.

Oi—0 to 1.5 inches; needles, twigs, bark, cones, and leaves.

Oe—1.5 to 2 inches; decomposed organic matter.

A—2 to 3 inches; gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; weak very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; neutral (pH 7.0); abrupt wavy boundary.

BA—3 to 11 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; weak medium and thick platy structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; neutral (pH 7.0); clear wavy boundary.

Bt1—11 to 18 inches; pale yellow (2.5Y 7/3) silty clay loam, light olive brown (2.5Y 5/3) moist; weak medium and thick platy structure; hard, firm, moderately sticky, moderately plastic; few medium and common very fine and fine roots;

common very fine and fine tubular pores; few faint clay films on faces of peds and lining pores; many light yellowish brown (2.5Y 6/3) lamellae, 1/2- to 1-inch thick; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—18 to 32 inches; pale yellow (5Y 7/3) silty clay loam, olive (5Y 5/3) moist; weak medium and thick platy structure; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine tubular pores; few faint light yellowish brown (10YR 6/4) clay films on faces of peds and lining pores; many pale olive (5Y 6/3) lamellae, 1/2- to 1-inch thick; neutral (pH 6.7); clear wavy boundary.

Bk1—32 to 48 inches; light gray (5Y 7/2) silt loam, olive gray (5Y 5/2) moist; weak medium and thick platy structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine tubular pores; violently effervescent; few medium and common fine lime seams and masses; moderately alkaline (pH 8.0); gradual wavy boundary.

Bk2—48 to 60 inches; light gray (5Y 7/2) silt loam, olive gray (5Y 5/2) moist; weak thick and very thick platy structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine tubular pores; violently effervescent; few medium and common fine lime seams and masses; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 45 to 47 degrees F

Average summer soil temperature: 55 to 59 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Depth to secondary calcium carbonate: 24 to 44 inches

A horizon

Value: 4 to 6 dry; 2 to 4 moist

Chroma: 1 or 2 dry or moist

Clay content: 15 to 22 percent

Reaction: Slightly acid or neutral

BA horizon

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Clay content: 15 to 22 percent

Reaction: Slightly acid or neutral

Bt horizons

Hue: 2.5Y or 5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Texture: Silty clay loam or silt loam

Clay content: 25 to 34 percent

Lamellae: Common to many; 1/2- to 2-inches thick; 2.5Y, 5Y, and 10YR 6/3 and 5/3 dry

Reaction: Slightly acid to slightly alkaline

Btk horizon present in some pedons

Texture: Silty clay loam or silt loam

Clay content: 25 to 34 percent

Lamellae: 1/16- to 1/4-inch thick

Effervescence: Strongly to violently

Calcium carbonate: Lime in seams and soft masses

Bk horizons

Hue: 5Y or 2.5Y

Clay content: 20 to 26 percent

Effervescence: Strongly to violently

Calcium carbonate concentrations: Few to many, fine to coarse, seams and soft masses

Calcium carbonate equivalent: 5 to 15 percent

Reaction: Moderately alkaline

C horizon present in some pedons

Texture: Silty clay loam or silt loam

Clay content: 20 to 30 percent

Effervescence: Slightly to strongly

Frycanyon Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Terraces

Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash mixed in surface layers

Slope range: 0 to 15 percent

Elevation: 2,200 to 2,400 feet

Average annual precipitation: 28 to 32 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 100 to 135 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Vitrandic Hapludalfs

Typical Pedon

Frycanyon ashy silt loam, 2 to 8 percent slopes, about 3 miles northeast of Bonners Ferry, about 150 feet south and 100 feet west of the northeast corner of sec. 14, T. 62 N., R. 1 E.; 48 degrees 43 minutes 52 seconds north latitude, 116 degrees 16 minutes 45 seconds west longitude.

Ap1—0 to 6 inches; pale brown (10YR 6/3) ashy silt loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure parting to

weak very fine granular; slightly hard, friable, slightly sticky, slightly plastic; few fine and medium and many very fine roots; few fine and many very fine tubular pores; slightly acid (pH 6.5); gradual wavy boundary.

Ap2—6 to 11 inches; pale brown (10YR 6/3) ashy silt loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine roots; few fine and many very fine tubular pores; neutral (pH 6.6); clear wavy boundary.

BA—11 to 17 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; few fine and many very fine tubular pores; slightly acid (pH 6.5); clear wavy boundary.

Bt1—17 to 27 inches; pale yellow (2.5Y 8/3) silt loam, light olive brown (2.5Y 5/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds and lining pores; few thin brown (7.5YR 4/4) moist discontinuous lamellae $\frac{1}{8}$ - to $\frac{1}{2}$ -inch thick; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—27 to 34 inches; pale yellow (2.5Y 8/3) silt loam, light olive brown (2.5Y 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds and lining pores; few thin brown (7.5YR 4/4) moist discontinuous lamellae $\frac{1}{8}$ - to $\frac{1}{2}$ -inch thick; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—34 to 42 inches; mixed very pale brown (10YR 7/4) and pale yellow (2.5Y 8/3) silt loam, mixed yellowish brown (10YR 5/4) and light olive brown (2.5Y 5/3) moist; weak fine and medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine roots; few fine and many very fine tubular pores; few distinct and common faint clay films on faces of peds and lining pores; few prominent silt coats on faces of peds; many thin yellowish brown (10YR 5/4) moist discontinuous lamellae $\frac{1}{4}$ - to $\frac{1}{2}$ -inch thick; neutral (pH 6.8); gradual wavy boundary.

Bt4—42 to 46 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few

very fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds and lining pores; many thin yellowish brown (10YR 5/4) moist discontinuous lamellae $\frac{1}{4}$ - to $\frac{1}{2}$ -inch thick; slightly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Bk—46 to 52 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine tubular pores; violently effervescent; few fine and medium hard lime concretions and common fine lime in seams and soft masses; moderately alkaline (pH 8.0); clear wavy boundary.

BC—52 to 60 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine tubular pores; violently effervescent; moderately alkaline (pH 8.0); clear wavy boundary.

C—60 to 62 inches; light yellowish brown (2.5Y 6/3) loamy very fine sand, olive brown (2.5Y 4/3) moist; massive; soft, very friable, slightly sticky, nonplastic; many very fine irregular pores; slightly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F

Average summer soil temperature: 52 to 56 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Depth to secondary calcium carbonates: 40 to 56 inches

Volcanic ash influence: 10- to 18-inches thick surface layers

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

Ap horizons

Chroma: 2 or 3 dry or moist

Texture: Ashy silt loam or ashy very fine sandy loam

Clay content: 4 to 14 percent

Reaction: Slightly acid or neutral

A horizon (present in undisturbed pedons)

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3 dry or moist

Texture: Ashy silt loam or ashy very fine sandy loam

Clay content: 4 to 14 percent

Thickness: 1 to 3 inches
Reaction: Slightly acid or neutral

BA horizon

Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 3 or 4 dry or moist
Texture: Silt loam, very fine sandy loam, ashy silt loam, or ashy very fine sandy loam
Clay content: 4 to 14 percent
Reaction: Slightly acid or neutral

Bw horizon (present in some pedons)

Value: 5 to 7 dry; 3 to 5 moist
Chroma: 3 or 4 dry or moist
Texture: Ashy silt loam or ashy very fine sandy loam
Reaction: Slightly acid or neutral

Bt horizons

Hue: 2.5Y or 10YR
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 3 or 4 dry or moist
Texture: Silt loam or very fine sandy loam
Clay content: 8 to 20 percent (averages <18 percent)
Lamellae: $\frac{1}{16}$ - to 2-inches thick; 7.5YR or 10YR 4/4, 5/4, 4/6 moist; clay content from 16 to 25 percent
Effervescence: None to slightly
Calcium carbonate equivalent: 0 to 5 percent
Reaction: Slightly acid to slightly alkaline

Btk horizon (present in some pedons)

Texture: Silt loam or very fine sandy loam
Calcium carbonate: Lime in soft masses, seams, and hard concretions

Bk horizon

Value: 7 or 8 dry; 5 or 6 moist
Chroma: 3 or 4 dry or moist
Texture: Silt loam or very fine sandy loam
Clay content: 5 to 15 percent
Effervescence: Strongly to violently
Calcium carbonate equivalent: 10 to 20 percent
Reaction: Moderately alkaline

BC horizon (absent in some pedons)

Value: 7 or 8 dry; 5 or 6 moist
Texture: Silt loam, very fine sandy loam, or loamy very fine sand
Clay content: 0 to 15 percent
Effervescence: Slightly to violently
Calcium carbonate equivalent: 0 to 10 percent
Reaction: Moderately alkaline

C horizon

Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 or 3 dry or moist
Texture: Loamy very fine sand, very fine sandy loam, or silt loam
Clay content: 0 to 15 percent
Effervescence: None to slightly
Calcium carbonate equivalent: 0 to 5 percent
Reaction: Moderately alkaline

Highfalls Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landform: Mountains, foothills, and footslopes
Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash
Slope range: 5 to 65 percent
Elevation: 2,800 to 5,000 feet
Average annual precipitation: 30 to 50 inches
Average annual air temperature: 43 to 46 degrees F
Frost-free period: 80 to 110 days

Taxonomic Class: Ashy over loamy-skeletal, glassy over mixed, superactive, frigid Alfic Udivitrands

Typical Pedon

Highfalls stony ashy silt loam, 35 to 65 percent slopes, bouldery, about 6.75 miles northwest of Naples, about 2,600 feet south and 1,800 feet east of the northwest corner of sec. 17, T. 61 N., R. 1 W.; 48 degrees 38 minutes 15 seconds north latitude, 116 degrees 29 minutes 25 seconds west longitude.

Oi—0 to 1.5 inches; needles, leaves, twigs, and bark.

Oe—1.5 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) stony ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, nonsticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 5 percent gravel, 5 percent cobbles, and 5 percent stones; about .1 percent boulders and stones covering surface; slightly acid (pH 6.5); abrupt wavy boundary.

Bw1—3 to 8 inches; yellowish brown (10YR 5/4) stony ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky,

slightly plastic; few coarse, common medium, and many very fine and fine roots; many very fine and common fine tubular pores; 5 percent gravel, 5 percent cobbles, and 5 percent stones; slightly acid (pH 6.2); clear wavy boundary.

Bw2—8 to 18 inches; light yellowish brown (10YR 6/4) stony ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few coarse, common fine and medium, and many very fine roots; many very fine and common fine tubular pores; 5 percent gravel, 5 percent cobbles, and 5 percent stones; neutral (pH 7.0); clear wavy boundary.

2Bt—18 to 29 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few fine and common very fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds and lining pores; 30 percent gravel, 5 percent cobbles, and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

2C—29 to 60 inches; pale yellow (2.5Y 8/3) very cobbly fine sandy loam, light yellowish brown (2.5Y 6/3) moist; massive; slightly hard, friable, nonsticky, slightly plastic; few very fine roots; few fine and common very fine tubular and irregular pores; 30 percent gravel, 25 percent cobbles, and 5 percent stones; neutral (pH 6.8).

Range in Characteristics

Surface boulders: 0 to 3 percent

Average annual soil temperature: 43 to 46 degrees F

Average summer soil temperature: 49 to 53 degrees F with an O horizon

Moisture control section: Dry 30 to 45 days (August to September); moist mid-September through July

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: Stony ashy silt loam, ashy silt loam, or gravelly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 0 to 20 percent

Cobble content: 0 to 5 percent

Stone and boulder content: 0 to 5 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Slightly acid or neutral

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Stony ashy silt loam, ashy silt loam, or gravelly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 5 to 25 percent

Cobble content: 0 to 10 percent

Stone content: 0 to 15 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Slightly acid or neutral

2Bt horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, or very cobbly fine sandy loam

Clay content: 3 to 8 percent

Gravel content: 10 to 30 percent

Cobble content: 5 to 35 percent

Stone content: 0 to 10 percent

Reaction: Slightly acid or neutral

2C horizon

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly fine sandy loam, very gravelly sandy loam, very cobbly sandy loam, or very cobbly fine sandy loam

Clay content: 3 to 8 percent

Gravel content: 15 to 35 percent

Cobble content: 15 to 40 percent

Stone content: 0 to 15 percent

Reaction: Slightly acid or neutral

Idamont Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Mountains, foothills, and footslopes

Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash

Slope range: 5 to 65 percent

Elevation: 2,300 to 4,900 feet

Average annual precipitation: 28 to 45 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Ashy over loamy, glassy over mixed, superactive, frigid Alfic Udivitrands

Typical Pedon

Idamont ashy silt loam, 15 to 35 percent slopes, Twentymile Peak Road southeast of Naples, about 1,000 feet north and 900 feet east of the southwest corner of sec. 16, T. 60 N., R. 1 E.; 48 degrees 32 minutes 51 seconds north latitude, 116 degrees 20 minutes 54 seconds west longitude (fig. 4).

Oi—0 to 1 inch; needles and twigs.

Oe—1 to 3 inches; partly decomposed needles and twigs mixed with Mt. St. Helens volcanic ash.

A—3 to 4 inches; grayish brown (10YR 5/2) ashy silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine pores; slightly acid (pH 6.4); abrupt wavy boundary.

Bw1—4 to 10 inches; light yellowish brown (10YR 6/4) ashy silt loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine pores; slightly acid (pH 6.4); clear wavy boundary.

Bw2—10 to 21 inches; light yellowish brown (10YR 6/4) ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine pores; slightly acid (pH 6.2); clear wavy boundary.

2Bw3—21 to 31 inches; very pale brown (10YR 7/4) gravelly loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; many very fine and fine pores; 15 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

2Bt—31 to 55 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine roots; many fine and medium pores; few faint clay films on faces of peds and lining pores; many thin yellowish brown (10YR 5/4) lamellae; 25 percent gravel; slightly acid (pH 6.4); gradual wavy boundary.

3C—55 to 60 inches; light gray (10YR 7/2) extremely cobbly sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, nonsticky, nonplastic; 50 percent gravel, 20 percent cobbles, and 10 percent stones; slightly acid (pH 6.4).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F
Average summer soil temperature: 49 to 53 degrees F with an O horizon

Moisture control section: Dry 20 to 35 days (August to September); moist mid-September through July

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Hue: 10YR or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: Ashy silt loam or gravelly ashy silt loam

Clay content: 3 to 8 percent

Gravel content: 0 to 25 percent

Moist bulk density: .65 to .85 g/cm³

Reaction: Moderately acid to neutral

Bw horizons

Hue: 10YR or 7.5YR

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 4 or 6 dry or moist

Texture: Ashy silt loam or gravelly ashy silt loam; cobbly ashy silt loam in lower part of some pedons

Clay content: 3 to 8 percent

Gravel content: 0 to 25 percent

Moist bulk density: .65 to .85 g/cm³

Reaction: Slightly acid to neutral

2Bw3 horizon (absent in some pedons)

Hue: 10YR or 7.5YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Gravelly sandy loam, gravelly fine sandy loam, gravelly loam, sandy loam, fine sandy loam, loam, cobbly loam, or cobbly sandy loam

Clay content: 3 to 8 percent

Gravel content: 10 to 25 percent

Cobble content: 0 to 3 percent

Stone content: 0 to 2 percent

Reaction: Moderately acid to slightly acid

2Bt horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Gravelly sandy loam, gravelly fine sandy loam, gravelly loam, cobbly fine sandy loam, cobbly loam, or cobbly sandy loam

Clay content: 3 to 8 percent

Gravel content: 15 to 20 percent

Cobble content: 0 to 13 percent
 Stone content: 0 to 2 percent
 Reaction: Moderately acid to slightly acid

3C horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 to 6 moist
 Chroma: 2 to 4 dry or moist
 Texture: Very gravelly sandy loam, very cobbly sandy loam, extremely gravelly sandy loam, or extremely cobbly sandy loam
 Clay content: 0 to 5 percent
 Gravel content: 25 to 50 percent
 Cobble content: 15 to 20 percent
 Stone content: 0 to 15 percent
 Reaction: Moderately acid to slightly acid

Jaypeak Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Mountains and escarpments
 Parent material: Weathered material derived from schist, gneiss, and granite bedrock with a thick mantle of volcanic ash
 Slope range: 35 to 85 percent
 Elevation: 1,800 to 4,900 feet
 Average annual precipitation: 30 to 50 inches
 Average annual air temperature: 42 to 45 degrees F
 Frost-free period: 70 to 110 days

Taxonomic Class: Ashy over loamy-skeletal, glassy over paramicaceous, frigid Typic Udivitrands

Typical Pedon

Jaypeak gravelly ashy silt loam, 35 to 75 percent slopes, about 2.6 miles south of Naples, about 1,100 feet north and 2,025 feet east of the southwest corner of sec. 19, T. 60 N., R. 1 E.; 48 degrees 32 minutes 13 seconds north latitude, 116 degrees 23 minutes 22 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, twigs, cones, bark, and moss.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) gravelly ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; few fine and many very fine roots; many very fine tubular pores; 15 percent gravel and 5 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

Bw1—3 to 9 inches; yellowish brown (10YR 5/4) gravelly ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; many very fine tubular pores; 15 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bw2—9 to 19 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and common very fine roots; few fine and many very fine tubular pores; 20 percent gravel, 5 percent cobbles, and 5 percent stones; neutral (pH 6.8); clear wavy boundary.

2BC—19 to 26 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine tubular pores; many very fine and fine mica flakes; 40 percent gravel, 10 percent cobbles, and 10 percent stones; slightly acid (pH 6.3); gradual wavy boundary.

2C1—26 to 41 inches; light yellowish brown (10YR 6/4) extremely stony loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few fine and medium and common very fine irregular and tubular pores; few medium and coarse and many very fine and fine mica flakes; 20 percent gravel, 25 percent cobbles, and 35 percent stones; moderately acid (pH 6.0); gradual wavy boundary.

2C2—41 to 53 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine, fine, and medium irregular and tubular pores; few medium and many very fine and fine mica flakes; 50 percent gravel, 15 percent cobbles, and 5 percent stones; very strongly acid (pH 4.8); gradual wavy boundary.

2C3—53 to 60 inches; light yellowish brown (10YR 6/4) extremely stony loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine roots; few very fine and fine irregular and tubular pores; few medium and many very fine and fine mica flakes; 20 percent gravel, 20 percent cobbles, and 45 percent stones; very strongly acid (pH 4.8).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F
 Average summer soil temperature: 47 to 52 degrees F with an O horizon
 Moisture control section: Dry 15 to 30 days (August to September); moist September through July
 Depth to bedrock: More than 60 inches
 Surface stones: 0 to 3 percent
 Volcanic ash mantle: 14- to 20-inches thick
 Volcanic glass content: 30 to 65 percent
 Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist
 Chroma: 1 or 2 dry or moist
 Texture: Gravelly ashy silt loam or ashy silt loam
 Clay content: 3 to 8 percent
 Gravel content: 10 to 25 percent
 Cobble content: 0 to 10 percent
 Stone content: 0 to 5 percent
 Moist bulk density: .65 to .90 g/cm³
 Reaction: Moderately acid to neutral

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist
 Texture: Gravelly ashy silt loam, ashy silt loam, or cobbly ashy silt loam
 Clay content: 3 to 8 percent
 Gravel content: 10 to 25 percent
 Cobble content: 0 to 20 percent
 Stone content: 0 to 5 percent
 Moist bulk density: .65 to .90 g/cm³
 Reaction: Slightly acid or neutral

2BC horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Very gravelly loam, very gravelly fine sandy loam, very cobbly very fine sandy loam, very cobbly fine sandy loam, very stony loam, extremely stony loam, or very cobbly sandy loam
 Clay content: 3 to 10 percent
 Gravel content: 20 to 40 percent
 Cobble content: 10 to 25 percent
 Stone content: 5 to 40 percent
 Mica content: 25 to 35 percent
 Reaction: Moderately acid to slightly acid

2C horizons

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist

Texture: Extremely stony loam, extremely gravelly loam, extremely cobbly fine sandy loam, extremely cobbly loam, extremely stony fine sandy loam, extremely stony very fine sandy loam, or extremely cobbly sandy loam
 Clay content: 3 to 10 percent
 Gravel content: 20 to 50 percent
 Cobble content: 15 to 45 percent
 Stone content: 5 to 45 percent
 Mica content: 25 to 35 percent
 Reaction: Very strongly acid to moderately acid

Katka Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: High-elevation mountain slopes
 Parent material: Weathered material derived from granite and gneiss bedrock, with a thick mantle of volcanic ash
 Slope range: 35 to 65 percent
 Elevation: 5,000 to 6,100 feet
 Average annual precipitation: 50 to 60 inches
 Average annual air temperature: 38 to 42 degrees F
 Frost-free period: 30 to 60 days

Taxonomic Class: Medial over loamy-skeletal, glassy over mixed, superactive Typic Haplocryands

Typical Pedon

Katka gravelly medial silt loam, in an area of Katka, very bouldery-Rock outcrop complex, 35 to 65 percent slopes, about 5 miles east of Naples, about 2,025 feet south and 400 feet west of the northeast corner of sec. 14, T. 60 N., R. 1 E.; 48 degrees 33 minutes 13 seconds north latitude, 116 degrees 16 minutes 55 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, twigs, cones, and bark.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; dark gray (10YR 4/1) gravelly medial silt loam, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; common medium and many very fine and fine roots; many very fine, fine, and medium tubular pores; 20 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

AB—3 to 7 inches; brown (10YR 5/3) gravelly medial silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; common medium and many very fine and fine tubular pores; 20 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

Bw—7 to 16 inches; yellowish brown (10YR 5/4) gravelly medial silt loam, dark yellowish brown (10YR 3/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; many very fine and common fine tubular pores; 20 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

2BC—16 to 30 inches; light yellowish brown (10YR 6/4) very stony sandy loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few medium and coarse and common very fine and fine roots; few fine and many very fine tubular pores; 15 percent gravel, 10 percent cobbles, and 35 percent stones; slightly acid (pH 6.3); gradual wavy boundary.

2C1—30 to 44 inches; light yellowish brown (10YR 6/4) extremely stony sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky, slightly plastic; few medium and coarse and common very fine and fine roots; few fine and many very fine tubular pores; 15 percent gravel, 10 percent cobbles, and 40 percent stones; slightly acid (pH 6.5); gradual wavy boundary.

2C2—44 to 60 inches; very pale brown (10YR 7/4) extremely stony coarse sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; many very fine tubular and irregular pores; 15 percent gravel, 15 percent cobbles, and 45 percent stones; slightly acid (pH 6.2).

Range in Characteristics

Average annual soil temperature: 39 to 42 degrees F

Average summer soil temperature: 43 to 46 degrees F with an O horizon

Moisture control section: Dry 30 to 45 days (August to September); moist October through July

Surface boulders: .1 to 3 percent

Depth to bedrock: More than 60 inches

Volcanic ash mantle: 14- to 16-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 80 to 100 percent

A horizon

Chroma: 1 or 2 dry or moist

Gravel content: 15 to 25 percent

Clay content: 3 to 9 percent

Cobble content: 0 to 5 percent

Stone content: 0 to 5 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Strongly acid to slightly acid

AB horizon

Chroma: 2 or 3 dry or moist

Clay content: 3 to 9 percent

Gravel content: 15 to 25 percent

Cobble content: 0 to 5 percent

Stone content: 0 to 5 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Moderately acid to slightly acid

Bw horizon

Value: 5 or 6 dry; 3 or 4 moist

Texture: Gravelly medial silt loam or stony medial silt loam

Clay content: 3 to 9 percent

Gravel content: 10 to 20 percent

Cobble content: 0 to 5 percent

Stone content: 0 to 10 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Moderately acid to slightly acid

2BC horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very stony sandy loam or very cobbly sandy loam

Clay content: 3 to 9 percent

Gravel content: 15 to 25 percent

Cobble content: 10 to 25 percent

Stone content: 10 to 35 percent

Reaction: Moderately acid to slightly acid

2C horizons

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Extremely stony sandy loam, extremely stony coarse sandy loam, or extremely stony loamy coarse sand

Clay content: 3 to 9 percent

Gravel content: 10 to 25 percent

Cobble content: 10 to 25 percent

Stone content: 30 to 50 percent

Reaction: Moderately acid to slightly acid

Kriest Series

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Landform: Mountains, foothills, and ridges

Parent material: Glacial till and residuum derived from granite, gneiss, and schist with minor amounts of loess and volcanic ash in the surface layers

Slope range: 5 to 65 percent

Elevation: 1,800 to 3,800 feet

Average annual precipitation: 25 to 35 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 120 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Vitrandic Dystroxerepts

Typical Pedon

Kriest gravelly ashy sandy loam, in an area of Dufort-Rock outcrop-Kriest complex, 35 to 65 percent slopes, about 7 miles west of Bonners Ferry on the north side of Myrtle Creek, about 500 feet north and 200 feet east of the southwest corner of sec. 15, T. 62 N., R. 1 W.; 48 degrees 43 minutes 05 seconds north latitude, 116 degrees 27 minutes 34 seconds west longitude.

Oi—0 to 1.5 inches; needles, leaves, and twigs.

Oe—1.5 to 2 inches; partly decomposed needles, leaves, and twigs mixed with Mt. St. Helens volcanic ash.

A—2 to 4 inches; grayish brown (10YR 5/2) gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many very fine pores; 25 percent gravel; moderately acid (pH 5.9); abrupt wavy boundary.

Bw1—4 to 8 inches; light yellowish brown (10YR 6/4) gravelly ashy sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure parting to moderate very fine and fine granular; slightly hard, friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many very fine pores; 25 percent gravel; moderately acid (pH 5.9); clear wavy boundary.

Bw2—8 to 18 inches; pale brown (10YR 6/3) gravelly ashy sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium and many coarse roots; many very fine pores; 25 percent gravel; moderately acid (pH 5.9); clear wavy boundary.

Bt1—18 to 27 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; common faint clay films lining pores and on some surfaces of peds; few $\frac{1}{16}$ to $\frac{1}{4}$ inch dark yellowish brown lamellae; 30 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

Bt2—27 to 34 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine and medium roots; many fine pores; many $\frac{1}{16}$ - to $\frac{1}{4}$ -inch dark brown lamellae; 15 percent gravel; moderately acid (pH 5.9); clear wavy boundary.

BC—34 to 43 inches; very pale brown (10YR 7/3) gravelly loamy sand, brown (10YR 5/3) moist; weak coarse subangular blocky structure; hard, firm, nonsticky, nonplastic; many fine pores; many $\frac{1}{16}$ to $\frac{1}{4}$ inch dark brown bands; 30 percent gravel; slightly acid (pH 6.1); gradual wavy boundary.

2Cr—43 inches; weathered granitic bedrock.

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F
Average summer soil temperature: 53 to 55 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Thin light gray volcanic ash layer: $\frac{1}{2}$ - to 1-inch thick present in some pedons in undisturbed areas between the organic and mineral soil surface

Depth to bedrock: 40 to 60 inches

Volcanic ash influence: 10- to 16-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Hue: 10YR or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 to 4 dry or moist

Texture: Gravelly ashy sandy loam or gravelly ashy loam

Clay content: 4 to 8 percent

Gravel content: 15 to 30 percent

Reaction: Moderately acid to neutral

Bw horizons

Hue: 10YR or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Gravelly ashy sandy loam or gravelly ashy loam

Clay content: 2 to 8 percent

Gravel content: 15 to 30 percent

Cobble content: 0 to 3 percent

Reaction: Moderately acid to neutral

Bt horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Clay content: 2 to 5 percent

Gravel content: 15 to 30 percent

Cobble content: 0 to 3 percent

Reaction: Moderately acid or slightly acid

BC horizon

Hue: 10YR or 2.5Y

Texture: Gravelly loamy sand or gravelly sandy loam

Clay content: 2 to 5 percent

Gravel content: 20 to 30 percent

Cobble content: 0 to 3 percent

Reaction: Moderately acid or slightly acid

McArthur Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Mountains and escarpments

Parent material: Weathered material derived from schist, gneiss, and granite bedrock with minor amounts of volcanic ash in the surface

Slope range: 35 to 85 percent

Elevation: 1,800 to 4,800 feet

Average annual precipitation: 25 to 45 inches

Average annual air temperature: 44 to 46 degrees F

Frost-free period: 90 to 120 days

Taxonomic Class: Loamy-skeletal, paramicaceous, frigid Vitrandic Dystrochrepts

Typical Pedon

McArthur gravelly ashy very fine sandy loam, in an area of McArthur, very stony-Rock outcrop complex, 35 to 75 percent slopes, about 3.5 miles south of Naples, about 1,000 feet north and 1,725 feet east of the southwest corner of sec. 30, T. 60 N., R. 1 E.; 48 degrees 31 minutes 03 seconds north latitude, 116 degrees 23 minutes 29 seconds west longitude.

Oi—0 to 1.5 inches; needles, leaves, and twigs.

Oe—1.5 to 2 inches; decomposed organic matter.

A—2 to 3 inches; dark grayish brown (10YR 4/2) gravelly ashy very fine sandy loam, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; few fine and many very fine roots; many very fine tubular pores; common very fine mica flakes; 20 percent gravel; slightly acid (pH 6.2); abrupt wavy boundary.

AB—3 to 9 inches; brown (10YR 4/3) very cobbly ashy very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine, fine, and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; many very fine tubular pores; common very fine mica flakes; 15 percent gravel, 20 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); clear wavy boundary.

Bw—9 to 17 inches; yellowish brown (10YR 5/4) very cobbly ashy very fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine, medium, and coarse and many very fine roots; many very fine tubular pores; common very fine mica flakes; 20 percent gravel, 30 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

C1—17 to 31 inches; yellowish brown (10YR 5/4) very cobbly very fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; many very fine tubular and irregular pores; many very fine mica flakes; 30 percent gravel, 20 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

C2—31 to 45 inches; yellowish brown (10YR 5/4) very cobbly very fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine tubular and irregular pores; many very fine mica flakes; 25 percent gravel, 20 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

C3—45 to 57 inches; light yellowish brown (10YR 6/4) very cobbly very fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine tubular and irregular pores; many very fine mica flakes;

20 percent gravel, 35 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

C4—57 to 60 inches; light yellowish brown (10YR 6/4) very cobbly very fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine tubular and irregular pores; many very fine and few fine mica flakes; 15 percent gravel, 20 percent cobbles, and 5 percent stones; strongly acid (pH 5.5).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F
Average summer soil temperature: 52 to 56 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Surface stones: .1 to 15 percent

Depth to bedrock: More than 60 inches

Thickness of the umbric epipedon: 7 to 12 inches

Volcanic ash influence: 7- to 15-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 to 3 dry or moist

Texture: Gravelly ashy very fine sandy loam, gravelly ashy loam, or gravelly ashy fine sandy loam

Clay content: 3 to 10 percent

Gravel content: 15 to 25 percent

Cobble content: 0 to 5 percent

Stone content: 0 to 5 percent

Mica content: 2 to 20 percent

Reaction: Slightly acid to neutral

AB horizon

Value: 4 or 5 dry

Chroma: 2 or 3 dry or moist

Texture: Very cobbly ashy very fine sandy loam, very gravelly ashy loam, very gravelly ashy fine sandy loam, or very cobbly ashy loam

Clay content: 3 to 10 percent

Gravel content: 15 to 30 percent

Cobble content: 15 to 25 percent

Stone content: 0 to 5 percent

Mica content: 2 to 20 percent

Reaction: Strongly acid to slightly acid

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3 or 4 dry or moist

Texture: Very cobbly ashy very fine sandy loam, very cobbly ashy loam, very gravelly ashy loam, or very gravelly ashy fine sandy loam

Clay content: 3 to 10 percent

Gravel content: 20 to 40 percent

Cobble content: 15 to 30 percent

Stone content: 5 to 15 percent

Mica content: 2 to 20 percent

Reaction: Strongly acid to slightly acid

C horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very cobbly very fine sandy loam, extremely cobbly fine sandy loam, very cobbly fine sandy loam, very stony fine sandy loam, or extremely stony fine sandy loam

Clay content: 3 to 8 percent

Gravel content: 15 to 30 percent

Cobble content: 20 to 35 percent

Stone content: 5 to 40 percent

Mica content: 25 to 35 percent

Reaction: Strongly acid to slightly acid

Myrtlecreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Dissected terraces, escarpments, and canyon sides

Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers

Slope range: 15 to 75 percent

Elevation: 2,300 to 4,500 feet

Average annual precipitation: 30 to 45 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Sandy, mixed, frigid Vitrandic Dystrudepts

Typical Pedon

Myrtlecreek ashy sandy loam, 15 to 35 percent slopes, about 5.5 miles northwest of Naples, about 300 feet south and 1,250 feet west of the northeast corner of sec. 21, T. 61 N., R. 1 W.; 48 degrees 37 minutes 55 seconds north latitude, 116 degrees 28 minutes 05 seconds west longitude.

Oi—0 to .5 inch; needles, leaves, and twigs.

Oe—.5 to 1 inch; decomposed organic matter mixed with Mt. St. Helen's volcanic ash.

A—1 to 2 inches; dark gray (10YR 4/1) ashy sandy loam, black (10YR 2/1) moist; weak very fine

granular structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; moderately acid (pH 5.8); abrupt wavy boundary.

Bw1—2 to 8 inches; yellowish brown (10YR 5/4) ashy sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular and irregular pores; 5 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

Bw2—8 to 14 inches; light yellowish brown (10YR 6/4) ashy sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and common very fine roots; many very fine tubular and irregular pores; 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C1—14 to 19 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; common very fine irregular pores; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C2—19 to 33 inches; pale yellow (2.5Y 7/4) sand, light olive brown (2.5Y 5/4) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; common very fine irregular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

C3—33 to 41 inches; pale yellow (2.5Y 7/3) coarse sand, light olive brown (2.5Y 5/3) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

C4—41 to 49 inches; pale yellow (2.5Y 7/3) coarse sand, light olive brown (2.5Y 5/3) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

C5—49 to 60 inches; variegated sand; single grain; loose, nonsticky, nonplastic; common very fine irregular pores; 10 percent gravel; neutral (pH 6.8).

Range in Characteristics

Average annual soil temperature: 42 to 44 degrees F
Average summer soil temperature: 48 to 52 degrees F with an O horizon

Moisture control section: Dry 25 to 35 days (August to September); moist mid-September through July

Depth to sandy material: 12 to 24 inches

Volcanic ash influence: 10- to 18-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 or 5 dry; 2 to 4 moist

Chroma: 1 to 3 dry or moist

Texture: Ashy sandy loam, ashy loam, or ashy fine sandy loam

Clay content: 3 to 10 percent

Gravel content: 0 to 10 percent

Reaction: Moderately acid to neutral

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3 or 4 dry; 3 to 6 moist

Texture: Ashy sandy loam, ashy loam, or ashy fine sandy loam; gravelly ashy sandy loam in lower part of some pedons

Clay content: 3 to 10 percent

Gravel content: 0 to 25 percent

Reaction: Slightly acid or neutral

BC horizon (present in some pedons)

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4 or 6 dry or moist

Texture: Loamy sand, gravelly loamy sand, or sandy loam

Clay content: 2 to 5 percent

Gravel content: 0 to 25 percent

Reaction: Slightly acid or neutral

C horizons

Hue: 10YR, 2.5Y, or variegated

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4 dry; 3, 4, or 6 moist

Texture: Loamy sand, coarse sand, sand, gravelly coarse sand, or gravelly loamy sand

Clay content: 0 to 5 percent

Gravel content: 0 to 25 percent

Cobble content: 0 to 10 percent

Reaction: Slightly acid or neutral

Pearsoncreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Mountains and foothills

Parent material: Glacial till derived from granite, gneiss, and schist with a thin mantle of volcanic ash

Slope range: 5 to 65 percent

Elevation: 2,800 to 4,800 feet

Average annual precipitation: 30 to 45 inches

Average annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 120 days

Taxonomic Class: Loamy-skeletal, mixed,
superactive, frigid Andic Dystrudepts

Typical Pedon

Pearsoncreek ashy loam, 15 to 35 percent slopes, about 5.75 miles northwest of Naples, about 2,200 feet north and 2,300 feet east of the southwest corner of sec. 31, T. 61 N., R. 1 W.; 48 degrees 35 minutes 45 seconds north latitude, 116 degrees 31 minutes 00 seconds west longitude.

Oi—0 to .5 inch; needles, leaves, and twigs.

Oe—.5 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) ashy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine roots; many very fine tubular pores; slightly acid (pH 6.5); abrupt wavy boundary.

Bw1—3 to 9 inches; yellowish brown (10YR 5/4) ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; many very fine tubular pores; slightly acid (pH 6.5); clear wavy boundary.

Bw2—9 to 12 inches; light yellowish brown (10YR 6/4) ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine, medium, and coarse and many very fine roots; common very fine tubular pores; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.

2Bw3—12 to 17 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; common very fine tubular pores; 10 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2BC—17 to 29 inches; very pale brown (10YR 7/4) very cobbly sandy loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine tubular and irregular pores; 15 percent gravel and 30 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

2C1—29 to 50 inches; very pale brown (10YR 7/3) very cobbly sandy loam, mixed yellowish brown (10YR 5/4) and brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine roots; common very fine tubular and irregular pores; 30 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2C2—50 to 60 inches; pale yellow (2.5Y 7/3) very cobbly sandy loam, light olive brown (2.5Y 5/3) moist; massive; hard, firm, slightly sticky, slightly plastic; few fine roots; few fine and common very fine tubular pores; few faint silica coatings that are light yellowish brown (2.5Y 6/3) moist; 30 percent gravel and 20 percent cobbles; slightly acid (pH 6.3).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F

Average summer soil temperature: 54 to 56 degrees F with an O horizon

Moisture control section: Dry 30 to 45 days (August to September); moist mid-September through July

Depth to bedrock: More than 60 inches

Surface boulders: 0 to 3 percent

Volcanic ash mantle: 10- to 13-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3 dry or moist

Texture: Ashy loam, ashy silt loam, or gravelly ashy silt loam

Clay content: 3 to 10 percent

Gravel content: 0 to 20 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Moderately acid to neutral

Bw horizons

Hue: 10YR or 7.5YR

Value: 5 or 6 dry; 3 or 4 moist

Texture: Ashy loam, ashy silt loam, or gravelly ashy silt loam

Clay content: 3 to 10 percent

Gravel content: 0 to 20 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Slightly acid or neutral

2Bw horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6 dry or moist

Texture: Gravelly sandy loam, sandy loam, very cobbly sandy loam, very gravelly sandy loam, or very stony sandy loam

Clay content: 3 to 10 percent
 Gravel content: 5 to 25 percent
 Cobble content: 5 to 30 percent
 Stone content: 0 to 30 percent
 Reaction: Moderately acid to neutral

2BC horizon (absent in some pedons)

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Very cobbly sandy loam, very gravelly sandy loam, or very stony sandy loam
 Clay content: 3 to 10 percent
 Gravel content: 10 to 30 percent
 Cobble content: 5 to 30 percent
 Stone content: 0 to 30 percent
 Reaction: Moderately acid or slightly acid

2C horizons

Hue: 10YR or 2.5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 to 4 dry or moist
 Texture: Very gravelly sandy loam, very cobbly sandy loam, very stony sandy loam, very bouldery sandy loam, or extremely stony sandy loam
 Clay content: 3 to 10 percent
 Gravel content: 10 to 30 percent
 Cobble content: 10 to 30 percent
 Stone and boulder content: 0 to 30 percent
 Reaction: Moderately acid or slightly acid

Pend Oreille Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Mountains, foothills, footslopes, outwash terraces, and lateral moraines
 Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash
 Slope range: 2 to 65 percent
 Elevation: 2,200 to 4,800 feet
 Average annual precipitation: 30 to 45 inches
 Average annual air temperature: 42 to 45 degrees F
 Frost-free period: 70 to 100 days

Taxonomic Class: Ashy over loamy, glassy over mixed, superactive, frigid Alfic Udivitrands

Typical Pedon

Pend Oreille ashy silt loam, 15 to 35 percent slopes, about 5 miles northwest of Bonners Ferry on

Cascade Road, about 600 feet south and 150 feet east of the center of sec. 14, T. 62 N., R. 1 W.

Oi—0 to 2 inches; needles, leaves, and twigs.

Oe—2 to 3 inches; moderately decomposed needles, leaves, and twigs mixed with Mt. St. Helens volcanic ash.

A—3 to 7 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 3/4) moist; moderate very fine and fine granular structure; soft, friable, slightly sticky, slightly plastic; few coarse and many very fine and fine roots; many very fine and fine pores; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw1—7 to 17 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 4/6) moist; moderate fine granular structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw2—17 to 20 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; few coarse and many fine roots; many very fine and fine pores; 25 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2Bt—20 to 30 inches; light yellowish brown (10YR 6/4) cobbly sandy loam, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; common faint patchy clay films; 10 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2BC—30 to 60 inches; pale brown (10YR 6/3) cobbly sandy loam, brown (10YR 5/3) moist; massive; hard, firm, nonsticky, nonplastic; few fine roots; many very fine and fine pores; few faint patchy clay films; 10 percent gravel, 15 percent cobbles, and 5 percent stones; neutral (pH 6.7).

Range in Characteristics

Average annual soil temperature: 42 to 46 degrees F
 Average summer soil temperature: 47 to 53 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Surface boulders: 0 to 3 percent

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Acid-oxalate extractable A1 + $\frac{1}{2}$ Fe: 1 to 3 percent
 Phosphate retention: 55 to 90 percent
 15-bar water (air dried): 7 to 12 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist
 Chroma: 2 to 4 dry or moist
 Texture: Ashy silt loam, ashy loam, or gravelly ashy silt loam
 Clay content: 3 to 8 percent
 Gravel content: 0 to 20 percent
 Moist bulk density: .65 to 1 g/cm³
 Reaction: Slightly acid or neutral

Bw horizons

Hue: 10YR or 7.5YR
 Value: 5 or 6 dry; 3 or 4 moist
 Chroma: 3, 4, or 6 dry or moist
 Texture: Ashy silt loam, ashy loam, gravelly ashy silt loam, gravelly ashy loam, or cobbly ashy silt loam in lower part
 Clay content: 3 to 8 percent
 Gravel content: 0 to 25 percent
 Cobble content: 0 to 10 percent
 Moist bulk density: .65 to 1 g/cm³
 Reaction: Slightly acid or neutral

2Bt horizon

Hue: 2.5Y or 10YR
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Cobbly sandy loam, gravelly sandy loam, cobbly loam, gravelly loam, gravelly fine sandy loam, or cobbly fine sandy loam
 Clay content: 3 to 8 percent
 Gravel content: 5 to 15 percent
 Cobble content: 10 to 20 percent
 Lamellae: Present in some pedons $\frac{1}{16}$ - to $\frac{1}{2}$ -inch thick
 Reaction: Slightly acid or neutral

2BC horizon (absent in some pedons)

Hue: 2.5Y or 10YR
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 2 or 3 dry or moist
 Texture: Cobbly sandy loam, gravelly sandy loam, cobbly fine sandy loam, or cobbly loamy sand
 Clay content: 2 to 5 percent
 Gravel content: 5 to 10 percent
 Cobble content: 10 to 20 percent
 Stone content: 0 to 5 percent
 Reaction: Slightly acid or neutral

2C horizon (present in some pedons)

Hue: 2.5Y or 10YR
 Value: 6 to 8 dry; 5 or 6 moist
 Chroma: 2 to 4 dry or moist

Texture: Gravelly sandy loam or cobbly sandy loam, gravelly loamy sand, cobbly loamy sand, very gravelly sandy loam, very cobbly sandy loam, very gravelly loamy sand, or very cobbly loamy sand

Clay content: 2 to 5 percent
 Rock fragments: 25 to 50 percent
 Reaction: Slightly acid or neutral

Porthill Series

Depth class: Very deep (more than 60 inches)

Drainage class: Moderately well drained

Landform: Terraces

Parent material: Calcareous silty and clayey glaciolacustrine sediments with very minor amounts of volcanic ash in the surface layer

Slope range: 0 to 15 percent

Elevation: 2,000 to 2,400 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 100 to 135 days

Taxonomic Class: Fine, mixed, active, frigid Typic Hapludalfs

Typical Pedon

Porthill silt loam, 2 to 8 percent slopes, about 2.5 miles south of the Canadian border, about 150 feet south and 2,290 feet east of the northwest corner of sec. 26, T. 65 N., R. 1 W.; 48 degrees 57 minutes 46 seconds north latitude, 116 degrees 25 minutes 46 seconds west longitude.

Oi—0 to .5 inch; needles and twigs.

Oe—.5 to 1 inch; partly decomposed needles and twigs; trace of Mt. St. Helens volcanic ash in lower part.

A1—1 to 8 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to moderate fine granular; hard, friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; slightly acid (pH 6.2); clear wavy boundary.

A2—8 to 14 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; few fine black concretions; neutral (pH 6.6); clear wavy boundary.

Bt1—14 to 28 inches; light gray (2.5Y 7/2) silty clay loam, olive (5Y 5/3) moist; weak coarse prismatic

structure parting to moderate medium angular blocky; extremely hard, very firm, moderately sticky, moderately plastic; common fine and medium roots; many very fine and fine pores; common faint clay films on faces of peds; common faint silt coatings on surfaces of peds; many fine black concretions; neutral (pH 6.6); clear wavy boundary.

Bt2—28 to 33 inches; light gray (5Y 7/2) silty clay loam, olive (5Y 5/3) moist; weak coarse prismatic structure parting to moderate medium angular blocky; very hard, firm, moderately sticky, moderately plastic; common fine and medium roots that are matted between prisms; common very fine pores; common distinct clay films on faces of peds; slightly alkaline (pH 7.7); gradual wavy boundary.

Bk1—33 to 44 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 5/2) moist; moderate thick platy structure; very hard, firm, moderately sticky, moderately plastic; few fine roots that are matted between plates; common very fine pores; violently effervescent; many distinct lime veins and masses; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—44 to 52 inches; light gray (5Y 7/1) silty clay loam, light olive gray (5Y 6/2) moist; moderate thick platy structure; very hard, firm, moderately sticky, moderately plastic; common very fine pores; violently effervescent; common fine faint lime veins between plates; moderately alkaline (pH 8.4); abrupt smooth boundary.

C—52 to 60 inches; light gray (5Y 7/2) silt loam, olive gray (5Y 5/2) moist; moderate thick platy structure; very hard, firm, moderately sticky, moderately plastic; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F

Average summer soil temperature: 52 to 55 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Thin light gray volcanic ash layer: Present in some pedons in undisturbed areas between the organic and mineral soil surface

Depth to secondary calcium carbonates: 16 to 42 inches

Depth to seasonal perched water table: 12 to 18 inches (December to April)

Thin dark gray or dark grayish brown surface layer: Present in some undisturbed pedons; .5- to 1-inch thick

A horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Clay content: 12 to 18 percent

Reaction: Moderately acid to neutral

Bt horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Texture: Silty clay loam, silty clay, or silt loam

Clay content: 25 to 50 percent (averages >35 percent)

Effervescence: None to slightly

Calcium carbonate equivalent: 0 to 10 percent

Reaction: Slightly acid to slightly alkaline

Btk horizon (present in some pedons)

Hue: 2.5Y or 5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Texture: Silty clay loam, silty clay, or silt loam

Clay content: 25 to 50 percent (averages >35 percent)

Calcium carbonate: Lime in soft masses, seams, and hard concretions

Reaction: Moderately alkaline

Bk horizons

Hue: 2.5Y or 5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 1 to 3 dry or moist

Texture: Silty clay loam or silt loam

Clay content: 25 to 35 percent

Effervescence: Strongly to violently

Calcium carbonate equivalent: 10 to 15 percent

Reaction: Moderately alkaline

C horizon

Hue: 2.5Y or 5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 1 to 3 dry or moist

Texture: Silt loam or silty clay loam

Clay content: 25 to 35 percent

Effervescence: Slightly to violently

Calcium carbonate equivalent: 10 to 15 percent

Reaction: Moderately alkaline

Pywell Series

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Landform: Depressions on flood plains, drainageways, and valley floors

Parent material: Organic material derived from herbaceous plants
 Slope range: 0 to 1 percent
 Elevation: 1,750 to 2,800 feet
 Average annual precipitation: 23 to 30 inches
 Average annual air temperature: 42 to 46 degrees F
 Frost-free period: 80 to 110 days

Taxonomic Class: Euic, frigid Typic Haplosaprists

Typical Pedon

Pywell muck, protected, drained, 0 to 1 percent slopes, south end of drainage district No. 15, about 3.5 miles east of Bonners Ferry, about 100 feet south of power pole B596, about 2,000 feet north and 1,320 feet east of the southwest corner of sec. 32, T. 62 N., R. 2 E.; 48 degrees 40 minutes 45 seconds north latitude, 116 degrees 14 minutes 13 seconds west longitude.

Oap—0 to 10 inches; very dark brown (10YR 2/2) on broken face and rubbed, sapric material; about 15 percent fibers, about 5 percent after rubbing; moderate very fine and fine granular structure; many fine roots; neutral (pH 7.0); abrupt smooth boundary.

Oa1—10 to 14 inches; dark reddish brown (5YR 2/2) on broken face and rubbed, sapric material; about 25 percent fibers, about 5 percent after rubbing; moderate very fine and fine granular structure; many fine roots; neutral (pH 6.7); abrupt wavy boundary.

Oa2—14 to 22 inches; very dark gray (10YR 3/1) on broken face and rubbed, sapric material; about 25 percent fibers, less than 5 percent after rubbing; massive; few fine roots; 1/4 inch discontinuous layer of volcanic ash; neutral (pH 6.6); abrupt wavy boundary.

Oa3—22 to 33 inches; very dark brown (10YR 2/2) on broken face and rubbed, sapric material; about 20 percent fibers, less than 5 percent after rubbing; massive; 1/4 inch discontinuous layer of volcanic ash; slightly acid (pH 6.4); abrupt wavy boundary.

Oa4—33 to 70 inches; very dark gray (10YR 3/1) on broken face and rubbed, sapric material; about 25 percent fibers, less than 5 percent after rubbing; massive; 1/4 inch discontinuous layer of volcanic ash; slightly acid (pH 6.3).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F
 Depth to seasonal high water table: 12 to 36 inches (December to July) when drained; 0 to 12 inches (December to July) when undrained

Organic layers: More than 30-inches thick mostly sapric, but some pedons have variable amounts of fibric or hemic material

Volcanic ash: Thin, discontinuous layers present in some pedons (1/4- to 3-inches thick)

Woody material: 0 to 35 percent; present in the lower part of some pedons

Surface tier:

Hue: 10YR, 7.5YR, 5YR, or N

Value: 2 to 4 moist

Chroma: 0 to 3 moist; chroma and value may change 1 unit when pressed and rubbed

Reaction: Moderately acid to neutral

Subsurface tier:

Hue: 2.5Y, 10YR, 7.5YR, 5YR, or N

Value: 2 to 5 moist

Chroma: 0 to 4 moist

Reaction: Moderately acid to neutral

Bottom tier:

Hue: 5Y, 2.5Y, 10YR, 7.5YR, or 5YR

Value: 2 to 5 moist

Chroma: 0 to 4 moist

Reaction: Moderately acid to neutral

Redraven Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: High-elevation mountain slopes and lateral moraines

Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash

Slope range: 15 to 65 percent

Elevation: 4,800 to 5,800 feet

Average annual precipitation: 45 to 55 inches

Average annual air temperature: 38 to 42 degrees F

Frost-free period: 30 to 60 days

Taxonomic Class: Medial over loamy-skeletal, glassy over mixed, superactive Typic Haplocryands

Typical Pedon

Redraven medial silt loam, 15 to 35 percent slopes, about 6.4 miles southeast of Naples, about 325 feet south and 600 feet west of the northeast corner of sec. 25, T. 60 N., R. 1 E.

Oi—0 to 1 inch; needles, leaves, twigs, and cones.

Oe—1 to 2 inches; decomposed organic matter.

A—2 to 3 inches; dark grayish brown (10YR 4/2) medial silt loam, very dark brown (10YR 2/2)

moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; common medium and many very fine and fine tubular pores; 5 percent gravel; moderately acid (pH 5.6); abrupt wavy boundary.

Bw1—3 to 6 inches; yellowish brown (10YR 5/4) medial silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; common medium and many very fine and fine tubular pores; 5 percent gravel; moderately acid (pH 5.6); clear wavy boundary.

Bw2—6 to 18 inches; light yellowish brown (10YR 6/4) medial silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few medium and coarse and many very fine and fine roots; common medium and many very fine and fine tubular pores; 10 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

2Bw3—18 to 31 inches; light yellowish brown (2.5Y 6/3) very gravelly sandy loam, olive brown (2.5Y 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few medium and common very fine and fine roots; few fine and common very fine tubular pores; 35 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2BC—31 to 38 inches; light yellowish brown (2.5Y 6/3) very gravelly sandy loam, olive brown (2.5Y 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few very fine and fine roots; few fine and common very fine tubular pores; 35 percent gravel and 5 percent cobbles; slightly acid (pH 6.3); gradual wavy boundary.

2C1—38 to 52 inches; mixed light yellowish brown (2.5Y 6/3) and light gray (2.5Y 7/2) very gravelly sandy loam, olive brown (2.5Y 4/3) and grayish brown (2.5Y 5/2) moist; massive; hard, firm, nonsticky, slightly plastic; few very fine roots; common very fine and fine tubular and irregular pores; 40 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2C2—52 to 60 inches; mixed light yellowish brown (2.5Y 6/3) and light gray (2.5Y 7/2) very gravelly sandy loam, olive brown (2.5Y 4/3) and grayish

brown (2.5Y 5/2) moist; massive; hard, firm, nonsticky, slightly plastic; few fine and common very fine tubular and irregular pores; 40 percent gravel and 5 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Average annual soil temperature: 38 to 42 degrees F

Average summer soil temperature: 44 to 46 degrees F with an O horizon

Moisture control section: Dry 15 to 25 days (August to September); moist September through July

Surface boulders: 0 to 3 percent

Depth to bedrock: More than 60 inches

Volcanic ash mantle: 16- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 80 to 100 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2 dry or moist

Texture: Medial silt loam or gravelly medial silt loam

Clay content: 3 to 9 percent

Gravel content: 5 to 20 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Moderately acid

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Texture: Medial silt loam or gravelly medial silt loam; cobbly medial silt loam in lower part of some pedons

Clay content: 3 to 9 percent

Gravel content: 5 to 20 percent

Cobble content: 0 to 15 percent

Moist bulk density: .65 to .90 g/cm³

Reaction: Moderately acid to neutral

2Bw3 horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam, or very stony loam

Clay content: 3 to 9 percent

Gravel content: 15 to 35 percent

Cobble content: 5 to 25 percent

Stone content: 0 to 20 percent

Reaction: Moderately acid to neutral

2BC horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, very stony sandy loam, or extremely stony sandy loam

Clay content: 3 to 9 percent

Gravel content: 15 to 35 percent

Cobble content: 5 to 25 percent

Stone content: 0 to 40 percent

Reaction: Moderately acid to slightly acid

2C horizon

Value: 6 to 8 dry; 4 to 6 moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, very stony sandy loam, very stony fine sandy loam, very gravelly loamy sand, or extremely stony sandy loam

Clay content: 3 to 9 percent

Gravel content: 15 to 45 percent

Cobble content: 5 to 25 percent

Stone content: 0 to 40 percent

Reaction: Moderately acid to slightly acid

Ritz Series

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Landform: Flood plains

Parent material: Calcareous silty alluvium

Slope range: 0 to 2 percent

Elevation: 1,750 to 1,800 feet

Average annual precipitation: 23 to 28 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 110 to 140 days

Taxonomic Class: Coarse-silty, mixed, active, calcareous, frigid Aeric Fluvaquents

Typical Pedon

Ritz silt loam, in an area of Ritz-Schnoorson complex, protected, drained, 0 to 2 percent slopes, northeast part of drainage district No. 7, about 1,460 feet north and 420 feet east of the southwest corner sec. 7, T. 62 N., R. 1 E.; 48 degrees 44 minutes 10 seconds north latitude, 116 degrees 23 minutes 35 seconds west longitude.

Ap—0 to 8 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many fine pores; slightly effervescent; slightly alkaline (pH 7.6); abrupt wavy boundary.

Cg1—8 to 18 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic;

common fine roots; common fine pores; many medium distinct yellowish brown (10YR 5/6) redox concentrations; slightly effervescent; slightly alkaline (pH 7.7); abrupt wavy boundary.

Cg2—18 to 24 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky, slightly plastic; common fine roots; common very fine pores; many medium distinct yellowish brown (10YR 5/4) redox concentrations; slightly effervescent; slightly alkaline (pH 7.7); abrupt wavy boundary.

Cg3—24 to 32 inches; light gray (2.5Y 7/2) silt loam, gray (5Y 5/1) moist; massive; hard, friable, slightly sticky, slightly plastic; few fine roots; common very fine and fine pores; many medium distinct yellowish brown (10YR 5/4) redox concentrations; strongly effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

Cg4—32 to 46 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine pores; many medium distinct dark yellowish brown (10YR 4/4) redox concentrations; strongly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.

Cg5—46 to 60 inches; light gray (2.5Y 7/2) thinly stratified silt loam and very fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; common fine pores; many medium distinct dark yellowish brown (10YR 4/4) redox concentrations; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 45 to 47 degrees F
Average summer soil temperature: 60 to 63 degrees F

Depth to seasonal high water table: 0 to 24 inches undrained (December to July); 24 to 48 inches drained (December to May)

Buried A horizons: Present in many pedons

Snail shells: Common in some pedons

Ap horizon

Hue: 10YR or 2.5Y

Texture: Silt loam or very fine sandy loam

Clay content: 10 to 18 percent

Calcium carbonate equivalent: 5 to 10 percent

Effervescence: Slightly to strongly

Reaction: Slightly alkaline or moderately alkaline

AC horizon (present in some pedons)

Clay content: 10 to 18 percent

Reaction: Slightly alkaline or moderately alkaline

Cg horizons

Hue: 2.5Y, 5Y, or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1 or 2 dry or moist

Redox features: Distinct or prominent; hue 10YR or 7.5YR

Texture: Silt loam, or stratified silt loam, or very fine sandy loam

Clay content: 10 to 18 percent

Effervescence: Slightly to violently

Calcium carbonate equivalent: 5 to 20 percent

Reaction: Slightly alkaline or moderately alkaline

Roman Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Mountains

Parent material: Glacial till derived from granite, gneiss, and schist with a thin mantle of volcanic ash

Slope range: 15 to 65 percent

Elevation: 4,800 to 6,000 feet

Average annual precipitation: 45 to 55 inches

Average annual air temperature: 38 to 42 degrees F

Frost-free period: 30 to 60 days

Taxonomic Class: Sandy-skeletal, mixed Andic Dystrocrypts

Typical Pedon

Roman medial loam, in an area of Roman, extremely bouldery-Rock outcrop complex, 35 to 65 percent slopes, about 7.5 miles northwest of Naples, about 2,150 feet south and 750 feet east of the northwest corner of sec. 13, T. 61 N., R. 2 W.; 48 degrees 38 minutes 23 seconds north latitude, 116 degrees 33 minutes 03 seconds west longitude.

Oi—0 to .5 inch; moss, needles, leaves, and twigs mixed with wood ash, Mt. St. Helen's volcanic ash, and charcoal.

Oe—.5 to 1 inch; decomposed organic matter mixed with Mt. St. Helen's volcanic ash.

A—1 to 3 inches; grayish brown (10YR 5/2) medial loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; 5 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.

Bw1—3 to 6 inches; yellowish brown (10YR 5/4) cobbly medial loam, dark yellowish brown (10YR

3/4) moist; weak very fine and fine subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; 5 percent gravel and 10 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

Bw2—6 to 12 inches; light yellowish brown (10YR 6/4) cobbly medial loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; 5 percent gravel, 15 percent cobbles, and 5 percent stones; slightly acid (pH 6.4); clear wavy boundary.

2Bw3—12 to 25 inches; yellow (2.5Y 7/6) very cobbly sandy loam, light olive brown (2.5Y 5/6) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and common very fine roots; few fine and many very fine pores; few fine faint iron stains that are dark yellowish brown (10YR 4/6) moist; few fine mica flakes; 10 percent gravel, 30 percent cobbles, and 15 percent stones; slightly acid (pH 6.2); gradual wavy boundary.

2BC—25 to 31 inches; pale yellow (2.5Y 7/4) very cobbly loamy sand, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine, fine, and medium roots; common very fine irregular pores; many very fine mica flakes; 20 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid (pH 6.2); clear wavy boundary.

2C1—31 to 44 inches; mixed light gray (2.5Y 7/2) and pale yellow (2.5Y 7/3) very cobbly loamy sand, mixed grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, nonsticky, nonplastic; few very fine and fine roots; common very fine irregular pores; many very fine mica flakes; 25 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid (pH 6.2); clear wavy boundary.

2C2—44 to 60 inches; mixed light gray (2.5Y 7/2) and yellow (2.5Y 7/6) very cobbly sand, mixed grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; common very fine irregular pores; few fine faint iron stains that are yellowish brown (10YR 5/6) moist; many very fine mica flakes; 30 percent gravel and 30 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Average annual soil temperature: 39 to 43 degrees F
 Average summer soil temperature: 54 to 58 degrees F without an O horizon
 Moisture control section: Dry 15 to 30 days (mid-August to September); moist September through July
 Surface boulders: 3 to 15 percent
 Depth to bedrock: More than 60 inches
 Depth to sandy-skeletal material: 17 to 25 inches
 Volcanic ash mantle: 8- to 13-inches thick
 Volcanic glass content: 30 to 65 percent
 Phosphate retention: 55 to 90 percent

A horizon

Value: 4 to 6 dry; 2 to 4 moist
 Chroma: 2 or 3 dry or moist
 Texture: Medial loam, medial silt loam, or gravelly medial loam
 Clay content: 3 to 10 percent
 Gravel content: 5 to 25 percent
 Cobble content: 0 to 10 percent
 Moist bulk density: .65 to 1 g/cm³
 Reaction: Moderately acid or slightly acid

Bw horizons

Hue: 10YR or 7.5YR
 Value: 5 or 6 dry; 3 or 4 moist
 Chroma: 4 or 6 dry or moist
 Texture: Cobbly medial loam, gravelly medial loam, gravelly medial silt loam, medial loam, or medial silt loam
 Clay content: 3 to 10 percent
 Gravel content: 5 to 25 percent
 Cobble content: 0 to 15 percent
 Stone and boulder content: 0 to 10 percent
 Moist bulk density: .65 to 1 g/cm³
 Reaction: Moderately acid or slightly acid

2Bw3 horizon

Hue: 2.5Y or 10YR
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3, 4, or 6 dry or moist
 Texture: Very cobbly sandy loam, very gravelly sandy loam, gravelly sandy loam, cobbly sandy loam, or very stony sandy loam
 Clay content: 3 to 10 percent
 Gravel content: 10 to 30 percent
 Cobble content: 5 to 35 percent
 Stone and boulder content: 0 to 20 percent
 Reaction: Moderately acid or slightly acid

2BC horizon (absent in some pedons)

Hue: 2.5Y or 10YR
 Value: 6 or 7 dry; 5 or 6 moist

Chroma: 3, 4, or 6 dry or moist
 Texture: Very gravelly loamy sand or very cobbly loamy sand
 Clay content: 0 to 5 percent
 Gravel content: 15 to 30 percent
 Cobble content: 5 to 20 percent
 Stone and boulder content: 0 to 10 percent
 Reaction: Moderately acid or slightly acid

2C horizons

Hue: 10YR, 2.5Y, or variegated
 Value: 6 or 7 dry; 5 or 6 moist
 Chroma: 2 to 4 or 6 dry or moist
 Texture: Very gravelly loamy sand, very cobbly sand, very cobbly coarse sand, very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand, extremely stony loamy sand, extremely bouldery loamy coarse sand, extremely stony coarse sand, or very cobbly loamy sand
 Clay content: 0 to 5 percent
 Gravel content: 20 to 35 percent
 Cobble content: 10 to 30 percent
 Stone and boulder content: 0 to 30 percent
 Reaction: Moderately acid or slightly acid

Rubson Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Terraces
 Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash in surface layers
 Slope range: 0 to 15 percent
 Elevation: 2,100 to 2,700 feet
 Average annual precipitation: 25 to 32 inches
 Average annual air temperature: 42 to 45 degrees F
 Frost-free period: 100 to 135 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Vitrandic Hapludalfs

Typical Pedon

Rubson ashy silt loam, 2 to 8 percent slopes, about 1 mile northeast of the junction of U.S. Highways 2 and 95 and Paradise Valley Road, about 3.5 miles south of Bonners Ferry Ranger Station, about 300 feet north and 200 feet west of the southeast corner of sec. 16, T. 61 N., R. 1 E.; 48 degrees 37 minutes 53 seconds north latitude, 116 degrees 19 minutes 37 seconds west longitude (fig. 5).

Oi—0 to 2 inches; needles, leaves, and twigs.

Oe—2 to 3 inches; partially decomposed needles, leaves, and twigs mixed with Mt. St. Helens volcanic ash.

A—3 to 5 inches; pale brown (10YR 6/3) ashy silt loam, brown (7.5YR 4/2) moist; moderate fine granular structure; soft, friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; many very fine pores; slightly acid (pH 6.1); clear wavy boundary.

Bw1—5 to 11 inches; pale brown (10YR 6/3) ashy silt loam, brown (7.5YR 5/4) moist; weak fine granular structure; soft, friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; few fine and medium and many very fine pores; slightly acid (pH 6.2); clear wavy boundary.

Bw2—11 to 17 inches; pale brown (10YR 6/3) ashy silt loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; many very fine pores; moderately acid (pH 5.9); clear wavy boundary.

Bt1—17 to 26 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; many very fine and fine pores; few faint clay films on faces of peds and lining pores; few thin lamellae 2- to 4-mm thick; slightly acid (pH 6.1); clear wavy boundary.

Bt2—26 to 32 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; many very fine pores; few faint clay films on faces of peds and lining pores; common thin yellowish brown (10YR 5/4) lamellae .25- to .5-inch thick; slightly acid (pH 6.3); abrupt wavy boundary.

Bt3—32 to 35 inches; reddish yellow (7.5YR 6/6) silt loam, yellowish brown (10YR 5/4) and dark yellowish brown (10YR 3/4) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine roots; many very fine and fine pores; many faint clay films on faces of peds and lining pores; moderately acid (pH 5.7); abrupt wavy boundary.

Bt4—35 to 53 inches; very pale brown (10YR 7/3) very fine sandy loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine, medium, and coarse roots; many very fine pores; few faint clay films on faces of peds and lining pores; common wavy and discontinuous yellowish brown (10YR 5/4) lamellae about .5- to

2-inches thick; slightly acid (pH 6.3); abrupt wavy boundary.

Bt5—53 to 58 inches; yellowish brown (10YR 5/4) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; many very fine pores; few faint clay films and lamellae; slightly acid (pH 6.4); abrupt wavy boundary.

C—58 to 68 inches; light gray (10YR 7/2) loamy very fine sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky, nonplastic; many fine pores; slightly alkaline (pH 7.7).

Range in Characteristics

Average annual soil temperature: 42 to 45 degrees F

Average summer soil temperature: 52 to 56 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Volcanic ash influence: 12- to 20-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 to 6 dry; 2 to 4 moist

Chroma: 2 or 3 dry or moist

Texture: Ashy silt loam or ashy very fine sandy loam

Clay content: 5 to 10 percent

Reaction: Moderately acid to neutral

Bw horizons

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 3 or 4 dry or moist

Texture: Ashy silt loam or ashy very fine sandy loam

Clay content: 5 to 10 percent

Reaction: Moderately acid to neutral

Bt horizons

Hue: 10YR, 7.5YR, or 2.5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 3, 4, or 6 dry or moist

Texture: Silt loam or very fine sandy loam

Clay content: 5 to 17 percent

Lamellae: $\frac{1}{16}$ - to 2-inches thick; 10YR or 7.5YR 4/4, 4/6, 5/4 moist; clay content 16 to 25 percent

Reaction: Moderately acid to neutral

C horizon

Chroma: 2 or 3 dry or moist

Texture: Loamy very fine sand or very fine sandy loam

Clay content: 0 to 5 percent

Effervescence: None to strongly
Reaction: Neutral to slightly alkaline

Rubycreek Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landform: Mountains
Parent material: Glacial till derived from granite, gneiss, and schist with a thin mantle of volcanic ash
Slope range: 15 to 65 percent
Elevation: 5,000 to 6,000 feet
Average annual precipitation: 45 to 60 inches
Average annual air temperature: 38 to 42 degrees F
Frost-free period: 30 to 60 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Dystrocryepts

Typical Pedon

Rubycreek medial silt loam, 35 to 65 percent slopes, very bouldery, about 7.5 miles northwest of Naples, about 300 feet south and 1,050 feet west of the northeast corner of sec. 23, T. 61 N., R. 2 W.; 48 degrees 37 minutes 58 seconds north latitude, 116 degrees 33 minutes 10 seconds west longitude.

Oi—0 to .5 inch; leaves, twigs, grass, moss, and bark.

A—.5 to 2 inches; grayish brown (10YR 5/2) medial silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and common very fine roots; common very fine tubular pores; 5 percent gravel; strongly acid (pH 5.5); abrupt smooth boundary.

Bw1—2 to 7 inches; yellowish brown (10YR 5/6) medial silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and common very fine roots; common very fine tubular pores; 5 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bw2—7 to 11 inches; light yellowish brown (10YR 6/4) medial silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few very fine roots; many very fine tubular pores; 5 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2Bw3—11 to 19 inches; light yellowish brown (10YR 6/4) very stony loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular

blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; many very fine tubular pores; 10 percent gravel, 10 percent cobbles, and 20 percent stones; slightly acid (pH 6.5); clear wavy boundary.

2Bt—19 to 28 inches; pale yellow (2.5Y 7/4) very cobbly loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; many very fine tubular pores; very few faint clay films on faces of peds; common faint and few distinct silica coats on faces of peds that are light brownish gray (10YR 6/2) moist; 10 percent gravel and 30 percent cobbles; slightly acid (pH 6.3); clear wavy boundary.

2C—28 to 60 inches; mixed pale yellow (2.5Y 7/4) and (2.5Y 7/3) very cobbly sandy loam, light olive brown (2.5Y 5/4) and (2.5Y 5/3) moist; massive; slightly hard, friable, nonsticky, slightly plastic; common very fine tubular and irregular pores; few faint clay films on gravel that are dark yellowish brown (10YR 4/6) moist; small part of horizon is discontinuous weakly cemented by silica that is gray (10YR 6/1) moist; 25 percent gravel and 30 percent cobbles; slightly acid (pH 6.1).

Range in Characteristics

Average annual soil temperature: 39 to 43 degrees F

Average summer soil temperature: 54 to 58 degrees F without an O horizon

Moisture control section: Dry 15 to 30 days (mid-August to September); moist September through July

Surface boulders: .1 to 15 percent

Depth to bedrock: More than 60 inches

Volcanic ash mantle: 8- to 13-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3 dry or moist

Texture: Medial silt loam or medial loam

Clay content: 3 to 10 percent

Gravel content: 0 to 25 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Strongly acid

Bw horizons

Hue: 10YR or 7.5YR

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Medial silt loam, medial loam, cobbly medial loam, cobbly medial silt loam, gravelly

medial loam, gravelly medial silt loam, or stony medial silt loam

Clay content: 3 to 10 percent

Gravel content: 0 to 25 percent

Cobble content: 0 to 15 percent

Stone and boulder content: 0 to 20 percent

Moist bulk density: .65 to 1 g/cm³

Reaction: Moderately acid or slightly acid

2Bw3 horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6 dry or moist

Texture: Very stony loam, very cobbly loam, very cobbly sandy loam, very gravelly sandy loam, very stony sandy loam, or very bouldery sandy loam

Clay content: 3 to 10 percent

Gravel content: 5 to 35 percent

Cobble content: 5 to 25 percent

Stone and boulder content: 0 to 30 percent

Reaction: Moderately acid or slightly acid

2Bt horizon (absent in some pedons)

Hue: 10YR or 2.5Y

Chroma: 3 or 4 dry or moist

Texture: Very cobbly loam, very cobbly sandy loam, or very stony sandy loam

Clay content: 3 to 10 percent

Gravel content: 5 to 15 percent

Cobble content: 15 to 30 percent

Stone and boulder content: 0 to 20 percent

Reaction: Moderately acid or slightly acid

2BC horizon (present in some pedons)

Hue: 2.5Y, 10YR

Chroma: 3, 4, or 6 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, or very stony sandy loam

Clay content: 3 to 10 percent

Gravel content: 15 to 30 percent

Cobble content: 10 to 20 percent

Stone and boulder content: 5 to 20 percent

Reaction: Moderately acid or slightly acid

2C horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 4 or 6 dry or moist

Texture: Very cobbly sandy loam, extremely cobbly sandy loam, extremely stony sandy loam, very gravelly sandy loam, or extremely bouldery sandy loam

Clay content: 3 to 10 percent

Gravel content: 10 to 30 percent

Cobble content: 15 to 30 percent

Stone and boulder content: 0 to 30 percent

Reaction: Moderately acid or slightly acid

Schnoorson Series

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Landform: Depressions and swales on flood plains

Parent material: Silty and clayey alluvium

Slope range: 0 to 2 percent

Elevation: 1,750 to 1,800 feet

Average annual precipitation: 23 to 28 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 100 to 140 days

Taxonomic Class: Fine-silty, mixed, active, calcareous, frigid Aeric Fluvaquents

Typical Pedon

Schnoorson silty clay loam, protected, drained, 0 to 2 percent slopes, about 2 miles west of Bonners Ferry and south of the Kootenai River, about 1,140 feet south and 2,440 feet east of the northwest corner of sec. 29, T. 62 N., R. 1 E.; 48 degrees 41 minutes 59 seconds north latitude, 116 degrees 21 minutes 46 seconds west longitude.

Ap—0 to 6 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; slightly hard, friable, slightly sticky, moderately plastic; many fine roots; many fine pores; strongly effervescent; slightly alkaline (pH 7.8); abrupt wavy boundary.

Cg1—6 to 20 inches; light gray (2.5Y 7/1) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, moderately sticky, moderately plastic; common fine roots; many fine pores; common coarse distinct yellowish brown (10YR 5/4) and brown (7.5YR 5/4) redox concentrations; strongly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Cg2—20 to 31 inches; light gray (5Y 7/1) silty clay loam, dark gray (5Y 4/1) moist; massive; very hard, firm, moderately sticky, moderately plastic; many fine and medium pores; common coarse prominent brown (7.5YR 5/4) and light reddish brown (2.5YR 6/3) redox concentrations; slightly alkaline (pH 7.5); clear wavy boundary.

Cg3—31 to 40 inches; light gray (2.5Y 7/1) silty clay loam, dark gray (2.5Y 4/1) moist; massive; very hard, firm, moderately sticky, moderately plastic; many fine and medium pores; common coarse prominent brown (7.5YR 5/4) and reddish brown

(2.5YR 4/3) redox concentrations; slightly alkaline (pH 7.5); clear wavy boundary.

Cg4—40 to 65 inches; light gray (2.5Y 7/1) silty clay, bluish gray (5B 5/1) moist; massive; very hard, very firm, very sticky, very plastic; few fine and medium pores; common coarse prominent brown (7.5YR 5/4) redox concentrations; slightly alkaline (pH 7.5).

Range in Characteristics

Average annual soil temperature: 45 to 47 degrees F

Average summer soil temperature: 58 to 63 degrees F

Depth to seasonal high water table: 0 to 18 inches undrained (December to July); 18 to 36 inches drained (December to June)

Thin buried A horizons: Present in some pedons

Thin organic layers: Present in some pedons

Snail shells: Common in upper part of profile

Cracks: 1/2- to 2-inches wide extending from surface to a depth of 24 to 36 inches when dry

Ap horizon

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1 or 2 dry or moist

Texture: Silty clay loam or silt loam

Clay content: 18 to 35 percent

Effervescence: Slightly to violently

Calcium carbonate equivalent: 5 to 15 percent

Reaction: Slightly alkaline to moderately alkaline

Cg horizons

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1 or 2 dry or moist

Redox features: Common to many; chroma 3 to 6 dry or moist

Texture: Silty clay loam, stratified silty clay loam, or silt loam; silty clay below 40 inches

Clay content: 20 to 35 percent in upper part; 20 to 50 percent in lower part

Effervescence: None to violently

Calcium carbonate equivalent: 0 to 15 percent

Reaction: Slightly alkaline to moderately alkaline

Seelovers Series

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Landform: Valley floors and flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation: 1,800 to 3,000 feet

Average annual precipitation: 24 to 35 inches

Average annual air temperature: 42 to 44 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Fluvaquentic Endoaquolls

Typical Pedon

Seelovers silt loam, 0 to 2 percent slopes, Hall Creek Area, about 500 feet south and 1,650 feet east of the northwest corner of sec. 25, T. 65 N., R. 1 W.; 48 degrees 57 minutes 43 seconds north latitude, 116 degrees 24 minutes 37 seconds west longitude.

Al—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine pores; slightly acid (pH 6.2); clear wavy boundary.

A2—6 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; slightly acid (pH 6.2); clear wavy boundary.

Bg1—12 to 17 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; many very fine and fine pores; common medium faint dark yellowish brown (10YR 4/4) redox concentrations; slightly acid (pH 6.2); clear wavy boundary.

Bg2—17 to 29 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine and fine pores; common medium and coarse prominent brown (7.5YR 4/4) redox concentrations; slightly acid (pH 6.3); abrupt wavy boundary.

Cg—29 to 60 inches; light gray (2.5Y 7/2) silt loam, olive gray (5Y 5/2) moist; massive; hard, firm, moderately sticky, moderately plastic; many very fine and fine pores; common medium and coarse prominent strong brown (7.5YR 5/6) redox concentrations; slightly acid (pH 6.3).

Range in Characteristics

Average annual soil temperature: 42 to 45 degrees F

Average summer soil temperature: 50 to 54 degrees F with an O horizon

Depth to seasonal high water table: 0 to 18 inches

undrained (December to July); 18 to 36 inches
drained (December to June)

Thin buried A horizons: Present in some pedons

A horizons

Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2 dry or moist
Clay content: 10 to 27 percent
Reaction: Slightly acid or neutral

Bg horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7 dry; 4 to 6 moist
Redox features: Common to many; value 4 or
5 moist; chroma 4 or 6 dry or moist
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent
Reaction: Slightly acid or neutral

Cg horizon

Hue: 2.5Y, 5Y, 5GY, or 5B
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 or 2 dry or moist
Redox features: Common to many; value 4 or
5 moist; chroma 4 or 6 dry or moist; few to
common manganese concretions and masses
in some pedons
Texture: Silt loam or silty clay loam (stratified in
some pedons with coarser texture layers)
Clay content: 18 to 35 percent
Reaction: Slightly acid or neutral

Selle Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Glaciolacustrine terraces

Parent material: Sandy glaciolacustrine sediments
with minor amounts of volcanic ash mixed in the
surface layers

Slope range: 0 to 7 percent

Elevation: 2,000 to 2,500 feet

Average annual precipitation: 25 to 30 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 100 to 130 days

Taxonomic Class: Sandy, mixed, frigid Vitrandic
Dystrudepts

Typical Pedon

Selle ashy fine sandy loam, in an area of Selle-Elmira
complex, 0 to 20 percent slopes, about 6 miles
southwest of Naples, about 2,600 feet north and
1,250 feet west of the southeast corner of sec. 33,
T. 60 N., R. 1 W.

Oi—0 to .5 inch; needles, leaves, and twigs.

Oe—.5 to 2 inches; partially decomposed needles,
leaves, and twigs mixed with Mt. St. Helens
volcanic ash.

A—2 to 3 inches; dark gray (10YR 4/1) ashy fine
sandy loam, black (10YR 2/1) moist; weak fine
granular structure; soft, very friable, slightly sticky,
slightly plastic; many very fine, fine, and medium
roots; many very fine and fine pores; moderately
acid (pH 6.0); abrupt wavy boundary.

Bw1—3 to 6 inches; brown (7.5YR 5/4) ashy fine
sandy loam, dark brown (7.5YR 3/4) moist; weak
fine granular structure; soft, very friable, slightly
sticky, slightly plastic; many very fine, fine, and
medium roots; many very fine and fine pores;
moderately acid (pH 6.0); clear wavy boundary.

Bw2—6 to 17 inches; light yellowish brown (10YR
6/4) ashy fine sandy loam, brown (7.5YR 4/4)
moist; weak medium subangular blocky structure;
soft, very friable, slightly sticky, slightly plastic;
many very fine roots; many very fine and fine
pores; moderately acid (pH 6.0); gradual wavy
boundary.

Bw3—17 to 33 inches; brown (7.5YR 5/4) loamy fine
sand, dark brown (7.5YR 4/4) moist; weak
medium subangular blocky structure; soft, very
friable, nonsticky, nonplastic; many very fine and
fine roots; many very fine and fine pores; slightly
acid (pH 6.4); clear wavy boundary.

E and Bt—33 to 42 inches; yellowish brown (10YR
5/4) fine sand, dark brown (10YR 4/3) moist;
massive; loose, nonsticky, nonplastic; many fine
roots; many very fine and fine pores; 35 percent
of matrix has 1/8- to 1/4-inch thick dark yellowish
brown (10YR 4/4) lamellae; neutral (pH 6.7);
gradual wavy boundary.

C—42 to 60 inches; pale brown (10YR 6/3) fine sand,
brown (10YR 4/3) moist; single grain; loose,
nonsticky, nonplastic; many very fine and fine
pores; neutral (pH 7.0).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F

Average summer soil temperature: 59 to 62 degrees
F without an O horizon

Moisture control section: Dry 15 to 30 days (August to
September); moist September through July

Thin light gray volcanic ash layer: 1/4- to 1/2-inch thick
present in some pedons in undisturbed areas
between the organic layers and mineral surface

Volcanic ash influence: 12- to 24-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 or 5 dry; 2 to 4 moist
 Chroma: 1 to 3 dry or moist
 Texture: Ashy fine sandy loam or ashy sandy loam
 Clay content: 2 to 4 percent
 Reaction: Moderately acid to neutral

Ap horizon (present in cultivated areas)

Clay content: 2 to 4 percent
 Reaction: Moderately acid to neutral

Bw horizons

Hue: 10YR or 7.5YR
 Value: 5 to 7 dry; 3 or 4 moist
 Chroma: 3 or 4 dry or moist
 Texture: Ashy fine sandy loam or ashy sandy loam; loamy fine sand in lower part
 Clay content: 2 to 4 percent
 Reaction: Moderately acid to neutral

E and Bt horizon

Hue: 10YR or 2.5Y
 Value: 5 to 7 dry; 3 to 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Loamy fine sand, fine sand, sand, or loamy sand
 Clay content: 2 to 4 percent
 Lamellae: $\frac{1}{16}$ - to $\frac{1}{2}$ -inch thick
 Reaction: Slightly acid or neutral

C horizon (absent in some pedons)

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 2 to 4 dry or moist
 Texture: Sand or fine sand
 Clay content: 2 to 4 percent
 Fine gravel: 0 to 5 percent
 Reaction: Slightly acid or neutral

Snowlake Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Dissected terraces, escarpments, and canyon sides
 Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers
 Slope range: 5 to 65 percent
 Elevation: 3,000 to 4,800 feet
 Average annual precipitation: 35 to 45 inches
 Average annual air temperature: 43 to 46 degrees F
 Frost-free period: 90 to 120 days

Taxonomic Class: Sandy, mixed, frigid Vitrandic Dystrudepts

Typical Pedon

Snowlake ashy sandy loam, 12 to 35 percent slopes, about 7 miles northwest of Naples, about 2,000 feet south and 2,200 feet west of the northeast corner of sec. 35, T. 61 N., R. 2 W.; 48 degrees 35 minutes 55 seconds north latitude, 116 degrees 33 minutes 28 seconds west longitude.

Oi—0 to .5 inch; needles, leaves, bark, and twigs.

Oe—.5 to 2 inches; decomposed organic matter mixed with Mt. St. Helen's volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) ashy sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, slightly sticky, slightly plastic; few fine, medium, and coarse and many very fine roots; many very fine irregular pores; moderately acid (pH 6.0); abrupt wavy boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/4) ashy sandy loam, dark yellowish brown (10YR 3/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium and many very fine roots; many very fine irregular pores; slightly acid (pH 6.5); clear wavy boundary.

Bw2—7 to 14 inches; light yellowish brown (10YR 6/4) ashy sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and many very fine roots; many very fine irregular pores; 5 percent fine gravel; slightly acid (pH 6.5); clear wavy boundary.

BC—14 to 25 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; common very fine irregular pores; 5 percent fine gravel; neutral (pH 6.7); clear wavy boundary.

C1—25 to 39 inches; pale yellow (2.5Y 7/4) fine gravelly loamy coarse sand, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; common very fine irregular pores; 15 percent fine gravel; slightly acid (pH 6.5); clear wavy boundary.

C2—39 to 52 inches; pale yellow (2.5Y 8/2) fine gravelly coarse sand, light brownish gray (2.5Y 6/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; one thin discontinuous lamellae $\frac{1}{4}$ -inch thick; 20 percent fine gravel; slightly acid (pH 6.5); gradual wavy boundary.

C3—52 to 62 inches; pale yellow (2.5Y 8/2) gravelly coarse sand, light brownish gray (2.5Y 6/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; 20 percent fine and 5 percent medium and coarse gravel; slightly acid (pH 6.5).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F
Average summer soil temperature: 54 to 58 degrees F without an O horizon

Moisture control section: Dry 30 to 45 days (August to mid-September); moist mid-September through July

Depth to sandy material: 10 to 20 inches

Volcanic ash influence: 10- to 18-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: Ashy sandy loam or gravelly ashy sandy loam

Clay content: 3 to 10 percent

Gravel content: 0 to 20 percent (0 to 10 percent fine gravel)

Reaction: Moderately acid

Bw horizons

Hue: 10YR or 7.5YR

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Ashy sandy loam or gravelly ashy sandy loam

Clay content: 3 to 10 percent

Gravel content: 0 to 15 percent (0 to 10 percent fine gravel)

Reaction: Slightly acid or neutral

BC horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 4 or 6 dry or moist

Texture: Loamy sand or gravelly loamy sand

Clay content: 2 to 5 percent

Gravel content: 0 to 15 percent (0 to 10 percent fine gravel)

Lamellae: Few thin discontinuous 1/16- to 1/4-inch thick; present in some pedons

Reaction: Slightly acid or neutral

C horizon

Hue: 10YR, 2.5Y, or variegated

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 4 or 6 dry or moist

Texture: Fine gravelly loamy coarse sand, fine gravelly coarse sand, gravelly coarse sand, loamy coarse sand, gravelly loamy sand, gravelly loamy coarse sand, or coarse sand

Clay content: 0 to 3 percent

Gravel content: 5 to 30 percent (5 to 20 percent fine gravel)

Lamellae: Absent in some pedons

Reaction: Moderately acid to neutral

Stien Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Glacial moraines and outwash terraces

Parent material: Glacial outwash and drift with a thick mantle of volcanic ash

Slope range: 0 to 15 percent

Elevation: 1,800 to 2,800 feet

Average annual precipitation: 25 to 32 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Ashy-skeletal, glassy, frigid Typic Vitrixerands

Typical Pedon

Stien gravelly ashy silt loam, moist, 2 to 8 percent slopes, near Robinson Lake, about 900 feet north of the center of sec. 21, T. 65 N., R. 2 E.; 48 degrees 58 minutes 24 seconds north latitude, 116 degrees 12 minutes 34 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, and twigs.

Oe—1 to 2 inches; partly decomposed needles, leaves, and twigs.

A—2 to 3 inches; dark grayish brown (10YR 4/2) gravelly ashy silt loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; 20 percent gravel; slightly acid (pH 6.2); abrupt wavy boundary.

Bw1—3 to 6 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine pores; 25 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

Bw2—6 to 17 inches; light yellowish brown (10YR 6/4) very gravelly ashy silt loam, dark brown (7.5YR 4/4) moist; weak medium subangular

blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine pores; 55 percent gravel and 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

2BC—17 to 27 inches; very pale brown (10YR 7/4) extremely cobbly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; loose, nonsticky, nonplastic; few fine roots; many fine pores; 35 percent gravel and 50 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

3C—27 to 60 inches; very pale brown (10YR 7/3) extremely cobbly coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky, nonplastic; very porous; 40 percent gravel and 30 percent cobbles; slightly acid (pH 6.5).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F
Average summer soil temperature: 54 to 58 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Very thin light gray volcanic ash layer: Present in most undisturbed pedons between the organic and upper mineral layer

Surface cobbles: 0 to 3 percent

Volcanic ash mantle: 14- to 20-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3 dry or moist

Texture: Gravelly ashy silt loam, cobbly ashy silt loam, or ashy silt loam

Clay content: 3 to 10 percent

Gravel content: 0 to 30 percent

Cobble content: 0 to 20 percent

Moist bulk density: .65 to .85 g/cm³

Reaction: Slightly acid or neutral

Bw horizons

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 4 or 6 dry or moist

Texture: Gravelly ashy silt loam, cobbly ashy silt loam, ashy silt loam upper part, very gravelly ashy silt loam, or very cobbly ashy silt loam; extremely gravelly ashy silt loam in lower part

Clay content: 3 to 10 percent

Gravel content: 0 to 30 percent upper part; 15 to 60 percent lower part; averages greater than 35 percent

Cobble content: 0 to 20 percent upper part; 0 to 40 percent lower part

Moist bulk density: .65 to .85 g/cm³

Reaction: Slightly acid or neutral

2BC horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 3 or 4 dry or moist

Texture: Extremely cobbly sandy loam, very cobbly sandy loam, very gravelly sandy loam, or extremely gravelly sandy loam

Clay content: 3 to 8 percent

Gravel content: 30 to 45 percent

Cobble content: 20 to 50 percent

Reaction: Strongly acid to slightly acid

3C horizon

Hue: 10YR, 2.5Y, or variegated

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 3 or 4 dry or moist

Texture: Extremely gravelly coarse sand, extremely cobbly sand, extremely cobbly loamy sand, extremely gravelly loamy sand, or extremely cobbly coarse sand

Clay content: 0 to 3 percent

Gravel content: 35 to 50 percent

Cobble content: 25 to 45 percent

Reaction: Strongly acid to slightly acid

Treble Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Mountains, foothills, and escarpments

Parent material: Glacial till derived from granite, gneiss, and schist with minor amounts of volcanic ash and loess in surface layers

Slope range: 5 to 65 percent

Elevation: 1,800 to 3,800 feet

Average annual precipitation: 25 to 35 inches

Average annual air temperature: 43 to 46 degrees F

Frost-free period: 80 to 130 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Vitrandic Dystrocherepts

Typical Pedon

Treble gravelly ashy sandy loam, 15 to 35 percent slopes, about 4.5 miles west of Bonners Ferry on the Myrtle Creek-Cascade Creek Road, about 2,340 feet south and 1,540 feet west of the northeast corner of sec. 23, T. 62 N., R. 1 W.; 48 degrees 42 minutes 39 seconds north latitude, 116 degrees 25 minutes 24 seconds west longitude.

Oi—0 to 1 inch; needles, leaves, and twigs.

Oe—1 to 2 inches; partially decomposed needles, leaves, and twigs.

A—2 to 4 inches; dark yellowish brown (10YR 4/4) gravelly ashy sandy loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many fine pores; 25 percent gravel; neutral (pH 6.9); abrupt wavy boundary.

Bw1—4 to 8 inches; brown (7.5YR 4/4) gravelly ashy sandy loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; common fine pores; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw2—8 to 14 inches; yellowish brown (10YR 5/4) gravelly ashy sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; 30 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

Bt1—14 to 24 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine, fine, and medium roots; few fine and many very fine pores; few faint clay films; 40 percent gravel; moderately acid (pH 5.9); clear wavy boundary.

Bt2—24 to 34 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and medium roots; few fine and many very fine pores; few faint clay films; 55 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

Bt3—34 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and medium roots; few fine and many very fine pores; few faint clay films; 35 percent gravel; slightly acid (pH 6.2).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F
Average summer soil temperature: 54 to 56 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Depth to bedrock: Greater than 60 inches

Base saturation: 35 to 60 percent

Thin light gray volcanic ash layer: 1/4- to 1/2-inch thick between the O and A horizons in some pedons in undisturbed areas

Volcanic ash influence: 10- to 20-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

Surface stones and boulders: 0 to 3 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 to 4 dry; 1 to 3 moist

Texture: Gravelly ashy sandy loam, gravelly ashy fine sandy loam, or gravelly ashy loam

Clay content: 3 to 10 percent

Gravel content: 15 to 25 percent

Cobble content: 0 to 10 percent

Reaction: Moderately acid to neutral

Bw horizons

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 3 or 4 dry or moist

Texture: Gravelly ashy sandy loam, gravelly ashy fine sandy loam, or gravelly ashy loam; very gravelly ashy sandy loam in lower part of some pedons

Clay content: 3 to 10 percent

Gravel content: 15 to 35 percent

Cobble content: 0 to 10 percent

Reaction: Moderately acid to neutral

Bt horizons (absent in some pedons)

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, very cobbly fine sandy loam, or very cobbly loam

Clay content: 0 to 10 percent

Gravel content: 30 to 60 percent

Cobble content: 0 to 30 percent

Stone content: 0 to 5 percent

Lamellae: Present in some pedons; 1/16- to 3/4-inch thick

Reaction: Moderately acid or slightly acid

C horizon (present in some pedons)

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 to 4 dry or moist

Texture: Very gravelly sandy loam, very cobbly sandy loam, very gravelly loamy sand,

extremely cobbly sandy loam, or extremely
gravelly sandy loam
Rock fragments: 35 to 75 percent
Reaction: Moderately acid or slightly acid

Typic Fluvaquents

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Landform: Lower positions on flood plains and valley
floors
Parent material: Stratified alluvium
Slope range: 0 to 2 percent
Elevation: 1,750 to 3,000 feet
Average annual precipitation: 23 to 35 inches
Average annual air temperature: 42 to 45 degrees F
Frost-free period: 80 to 120 days

Taxonomic Class: Typic Fluvaquents

Typical Pedon

Typic Fluvaquents, in an area of Seelovers-Typic
Fluvaquents-Aquic Udifluvents complex, 0 to
4 percent slopes, near the Moyie River south of
Good Grief, about 1,250 feet south and 250 feet west
of the northeast corner of sec. 10, T. 64 N., R. 2 E.

Oi—0 to .5 inch; grass, leaves, and twigs.

A—.5 to 4 inches; dark grayish brown (10YR 4/2) silt
loam, very dark brown (10YR 2/2) moist;
moderate medium and coarse subangular blocky
structure parting to weak fine and medium
granular; slightly hard, friable, slightly sticky,
slightly plastic; common medium and many very
fine and fine roots; few fine and medium and
many very fine tubular pores; moderately acid
(pH 5.6); clear wavy boundary.

AC—4 to 12 inches; light brownish gray (2.5Y 6/2) silt
loam, dark grayish brown (2.5Y 4/2) moist; weak
medium and coarse subangular blocky structure;
slightly hard, friable, nonsticky, slightly plastic; few
fine and medium and many very fine roots; few
fine and many very fine tubular pores; moderately
acid (pH 5.8); gradual wavy boundary.

Cg1—12 to 27 inches; light brownish gray (2.5Y 6/2)
stratified very fine sandy loam to loamy fine sand,
dark grayish brown (2.5Y 4/2) moist; massive;
slightly hard, friable, nonsticky, nonplastic; few
very fine, fine, and medium roots; few fine and
common very fine tubular pores; many medium
and coarse prominent brown (7.5YR 5/4) redox
concentrations; few fine manganese masses;
moderately acid (pH 6.0); abrupt wavy boundary.

Cg2—27 to 42 inches; light brownish gray (2.5Y 6/2)
and gray (5Y 6/1) stratified very fine sandy loam
to sand, dark grayish brown (2.5YR 4/2) and dark
gray (5Y 4/1) moist; massive to single grain;
slightly hard and friable to loose, nonsticky,
nonplastic; few very fine, fine, and medium roots;
few fine and many very fine tubular and irregular
pores; few fine manganese masses; many
medium and coarse prominent brown (7.5YR 5/4)
and strong brown (7.5YR 5/6) redox
concentrations; 0 to 10 percent gravel;
moderately acid (pH 6.0); abrupt wavy boundary.
Cg3—42 to 60 inches; gray (5Y 6/1) and variegated
stratified loamy sand to very cobbly coarse sand,
dark gray (5Y 4/1) and variegated moist; single
grain; loose, nonsticky, nonplastic; many very
fine interstitial pores; many medium and coarse
prominent brown (7.5YR 5/4) and strong
brown (7.5YR 5/6) redox concentrations; 10 to
25 percent gravel and 0 to 35 percent cobbles;
slightly acid (pH 6.5).

Range in Characteristics

Average annual soil temperature: 42 to 45 degrees F
Average summer soil temperature: 50 to 54 degrees
F with an O horizon

Depth to seasonal high water table: 0 to 18 inches
(December to July); 18 to 36 inches drained
(December to July)

Thin buried A horizons: Present in some pedons

A horizon

Texture: Silt loam, very fine sandy loam, or fine
sandy loam
Clay content: 8 to 15 percent
Gravel content: 0 to 10 percent
Reaction: Moderately acid to neutral

AC horizon

Texture: Silt loam or very fine sandy loam, or fine
sandy loam
Clay content: 8 to 15 percent
Gravel content: 0 to 10 percent
Reaction: Moderately acid to neutral

Cg horizons

Texture: Stratified very fine sandy loam, silt loam,
fine sandy loam, loamy fine sand, sandy loam,
loamy sand, or sand in upper part; stratified
very cobbly coarse sand, very gravelly coarse
sand, very cobbly sandy loam, cobbly loamy
sand, gravelly sand, coarse sand, or sand;
loamy sand in lower part
Clay content: 0 to 23 percent
Gravel content: 0 to 55 percent

Cobble content: 0 to 35 percent
 Reaction: Moderately acid to neutral

Typic Haplocryands

Depth class: Moderately deep (20 to 40 inches) and deep (40 to 60 inches) to dense basal till
 Drainage class: Well drained
 Landform: High-elevation mountains and lateral moraines
 Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash
 Slope range: 15 to 65 percent
 Elevation: 4,800 to 5,800 feet
 Average annual precipitation: 45 to 55 inches
 Average annual air temperature: 38 to 42 degrees F
 Frost-free period: 30 to 60 days

Taxonomic Class: Medial over loamy-skeletal, glassy over mixed, superactive Typic Haplocryands

Typical Pedon

Typic Haplocryands, in an area of Redraven medial silt loam, 15 to 35 percent slopes, about 6 miles southeast of Naples, about 350 feet north and 1,100 feet west of the southeast corner of sec. 24, T. 60 N., R. 1 E.; 48 degrees 31 minutes 55 seconds north latitude, 116 degrees 16 minutes 9 seconds west longitude, USGS Twentymile Creek topographic quadrangle.

- Oi—0 to 1 inch; needles, leaves, twigs, cones, and bark.
 Oe—1 to 2 inches; decomposed organic matter.
 A—2 to 3 inches; dark grayish brown (10YR 4/2) gravelly medial silt loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; 15 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.
 Bw1—3 to 7 inches; brown (10YR 5/3) gravelly medial silt loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular pores; 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
 Bw2—7 to 16 inches; yellowish brown (10YR 5/4) gravelly medial silt loam, dark yellowish brown

(10YR 3/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and many very fine roots; few fine and many very fine tubular pores; 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw3—16 to 22 inches; light yellowish brown (10YR 6/4) gravelly medial loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and medium and common very fine roots; few fine and many very fine tubular pores; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

2Bw4—22 to 29 inches; light yellowish brown (2.5Y 6/4) very gravelly sandy loam, olive brown (2.5Y 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and medium and common very fine roots; few fine and common very fine tubular and irregular pores; 30 percent gravel and 10 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

2Cd1—29 to 44 inches; light gray (2.5Y 7/2) very gravelly sandy loam, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, slightly sticky, slightly plastic; common very fine and fine tubular and irregular pores; few very fine roots flattened along weak planes; 45 percent gravel and 10 percent cobbles; slightly acid (pH 6.3); gradual wavy boundary.

2Cd2—44 to 53 inches; mixed light gray (2.5Y 7/2) and pale yellow (5Y 7/3) very gravelly sandy loam, grayish brown (2.5Y 5/2) and olive (5Y 5/3) moist; massive; very hard, very firm, slightly sticky, slightly plastic; few fine and common very fine tubular and irregular pores; few very fine roots flattened along weak planes; few faint and distinct iron stains along root channels; 40 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

3C—53 to 60 inches; pale yellow (5Y 7/3) very gravelly loamy sand, olive (5Y 5/3) moist; massive; slightly hard, friable, nonsticky, slightly plastic; few very fine and fine irregular pores; few very fine roots; few faint and distinct iron stains; 40 percent gravel and 5 percent cobbles; slightly acid (pH 6.2).

Range in Characteristics

Average annual soil temperature: 39 to 42 degrees F
 Average summer soil temperature: 44 to 46 degrees F with an O horizon

Moisture control section: Dry 15 to 25 days (August to September); moist September through July
 Depth to the dense 2Cd horizon: 29 to 60 inches
 Volcanic ash mantle: 14- to 20-inches thick
 Volcanic glass content: 30 to 65 percent
 Phosphate retention: 80 to 100 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist
 Chroma: 1 or 2 dry or moist
 Texture: Gravelly medial silt loam or medial silt loam
 Clay content: 3 to 9 percent
 Gravel content: 0 to 25 percent
 Moist bulk density: .65 to .90 g/cm³
 Reaction: Moderately acid to slightly acid

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist
 Chroma: 3 or 4 dry or moist
 Texture: Gravelly medial silt loam, gravelly medial loam, medial silt loam, medial loam, or cobbly medial silt loam
 Clay content: 3 to 9 percent
 Gravel content: 5 to 25 percent
 Cobble content: 0 to 15 percent
 Moist bulk density: .65 to .90 g/cm³
 Reaction: Moderately acid or slightly acid

2Bw horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Very gravelly sandy loam, very cobbly sandy loam, or very cobbly loam
 Clay content: 3 to 10 percent
 Gravel content: 15 to 35 percent
 Cobble content: 5 to 25 percent
 Reaction: Moderately acid or slightly acid

2Cd horizons

Hue: 2.5Y or 5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist
 Texture: Very gravelly sandy loam or very cobbly sandy loam
 Clay content: 3 to 10 percent
 Gravel content: 15 to 45 percent
 Cobble content: 5 to 25 percent
 Moist bulk density: 1.7 to 1.8 g/cm³
 Reaction: Moderately acid or slightly acid

3C horizon (absent in some pedons)

Hue: 5Y or 2.5Y
 Value: 6 to 8 dry; 4 to 6 moist
 Chroma: 2 or 3 dry or moist

Texture: Very gravelly loamy sand or very cobbly loamy sand
 Clay content: 3 to 9 percent
 Gravel content: 15 to 45 percent
 Cobble content: 5 to 25 percent
 Reaction: Moderately acid or slightly acid

Vitrandid Dystroxerepts

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Dissected terraces and escarpments
 Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers
 Slope range: 15 to 65 percent
 Elevation: 2,800 to 3,800 feet
 Average annual precipitation: 25 to 35 inches
 Average annual air temperature: 43 to 46 degrees F
 Frost-free period: 90 to 130 days

Taxonomic Class: Sandy-skeletal, mixed, frigid
 Vitrandid Dystroxerepts

Typical Pedon

Vitrandid Dystroxerepts, in an area of Treble gravelly ashy sandy loam, 15 to 35 percent slopes, about 2.75 miles southeast of Naples, about 1,350 feet north and 1,550 feet east of the southwest corner of sec. 16, T. 60 N., R. 1 E.; 48 degrees 32 minutes 54 seconds north latitude, 116 degrees 20 minutes 43 seconds west longitude, USGS Twentymile Creek topographic quadrangle.

Oi—0 to 1 inch; needles, leaves, twigs, bark, and cones.

Oe—1 to 2 inches; decomposed organic matter.

A—2 to 3 inches; grayish brown (10YR 5/2) gravelly ashy fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, slightly plastic; few medium and many very fine and fine roots; many very fine and common fine tubular pores; 15 percent gravel; slightly acid (pH 6.3); abrupt wavy boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/4) gravelly ashy fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; common fine and many very fine tubular pores; 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw2—7 to 15 inches; light yellowish brown (10YR 6/4) gravelly ashy sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few coarse, common fine and medium, and many very fine roots; many very fine and common fine tubular pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

BC—15 to 20 inches; light yellowish brown (10YR 6/4) very gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, nonplastic; few medium and coarse, common fine, and many very fine roots; many very fine irregular pores; 35 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C1—20 to 33 inches; variegated very gravelly coarse sand; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine irregular pores; 30 percent gravel and 5 percent cobbles; neutral (pH 6.8); gradual wavy boundary.

C2—33 to 44 inches; variegated extremely gravelly coarse sand; single grain; loose, nonsticky, nonplastic; few very fine roots; common fine and many very fine irregular pores; 45 percent gravel and 20 percent cobbles; neutral (pH 6.8); gradual wavy boundary.

C3—44 to 54 inches; variegated very gravelly coarse sand; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; 40 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

2C—54 to 62 inches; light gray (2.5Y 7/2) very cobbly sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, nonsticky, slightly plastic; few very fine roots; many very fine tubular pores; 25 percent gravel and 30 percent cobbles; moderately acid (pH 5.8).

Range in Characteristics

Average annual soil temperature: 44 to 46 degrees F

Average summer soil temperature: 54 to 56 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Depth to sandy-skeletal material: 10 to 15 inches

Volcanic ash influence: 10- to 15-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: Gravelly ashy fine sandy loam or gravelly ashy sandy loam

Clay content: 3 to 10 percent

Gravel content: 15 to 25 percent

Reaction: Slightly acid or neutral

Bw horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Gravelly ashy fine sandy loam or gravelly ashy sandy loam

Clay content: 3 to 10 percent

Gravel content: 15 to 25 percent

Reaction: Slightly acid or neutral

BC horizon (absent in some pedons)

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Very gravelly loamy coarse sand, very gravelly loamy sand, or very gravelly coarse sand

Clay content: 3 to 10 percent

Gravel content: 35 to 45 percent

Reaction: Slightly acid or neutral

C horizon

Hue: Variegated or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Very gravelly coarse sand, extremely gravelly coarse sand, very gravelly sand, very gravelly loamy sand, or very cobbly sand

Clay content: 0 to 5 percent

Gravel content: 30 to 50 percent

Cobble content: 0 to 25 percent

Reaction: Moderately acid to neutral

2C horizon (absent in some pedons)

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3 dry or moist

Texture: Very cobbly sandy loam or very cobbly loamy sand

Clay content: 3 to 10 percent

Gravel content: 20 to 35 percent

Cobble content: 5 to 35 percent

Reaction: Moderately acid or slightly acid

Vitrandid Dystrudepts

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Dissected terraces and escarpments

Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers

Slope range: 5 to 65 percent

Elevation: 2,200 to 4,800 feet

Average annual precipitation: 25 to 45 inches
 Average annual air temperature: 42 to 46 degrees F
 Frost-free period: 80 to 120 days

Taxonomic Class: Sandy-skeletal, mixed, frigid
 Vitrandic Dystrudepts

Typical Pedon

Vitrandic Dystrudepts, in an area of Caribouridge ashy silt loam, 35 to 65 percent slopes, about 2.5 miles southeast of Naples, about 450 feet south and 1,900 feet west of the northeast corner of sec. 17, T. 60 N., R. 1 E.; 48 degrees 33 minutes 28 seconds north latitude, 116 degrees 21 minutes 34 seconds west longitude, USGS Twentymile Creek topographic quadrangle.

Oi—0 to 1 inch; needles, leaves, twigs, bark, and cones.

Oe—1 to 2 inches; decomposed organic matter mixed with Mt. St. Helens volcanic ash.

A—2 to 3 inches; grayish brown (10YR 5/2) gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, slightly sticky, slightly plastic; few fine and many very fine roots; many very fine tubular and irregular pores; few very fine mica flakes; 15 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

Bw1—3 to 10 inches; yellowish brown (10YR 5/4) gravelly ashy sandy loam, dark yellowish brown (10YR 3/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium and many very fine roots; many very fine tubular and irregular pores; few very fine mica flakes; 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw2—10 to 17 inches; light yellowish brown (10YR 6/4) gravelly ashy sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium and common very fine roots; few fine and common very fine tubular and irregular pores; few very fine mica flakes; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

C1—17 to 30 inches; light yellowish brown (2.5Y 6/4) extremely gravelly sand, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky, nonplastic; few very fine, medium, and coarse and common fine roots; few medium and coarse and common very fine and fine irregular pores; few fine and common very fine mica flakes; 40 percent gravel,

20 percent cobbles, and 5 percent stones; slightly acid (pH 6.5); gradual wavy boundary.

C2—30 to 60 inches; light yellowish brown (2.5Y 6/4) extremely cobbly coarse sand, olive brown (2.5Y 4/3) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; few medium and common very fine and fine irregular pores; few fine and many very fine mica flakes; 40 percent gravel, 40 percent cobbles, and 5 percent stones; slightly acid (pH 6.5).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F
 Average summer soil temperature: 47 to 53 degrees F with an O horizon

Moisture control section: Dry 25 to 45 days (August to mid-September); moist mid-September through July

Depth to sandy-skeletal material: 14 to 20 inches

Volcanic ash influence: 14- to 20-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: Gravelly ashy sandy loam or ashy sandy loam

Clay content: 3 to 10 percent

Gravel content: 0 to 20 percent

Reaction: Slightly acid or neutral

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Texture: Gravelly ashy sandy loam or ashy sandy loam

Clay content: 3 to 10 percent

Gravel content: 5 to 25 percent

Cobble content: 0 to 5 percent

Reaction: Slightly acid or neutral

C horizons

Hue: 2.5Y or variegated

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Extremely gravelly sand, extremely cobbly coarse sand, very gravelly sand, or very cobbly loamy coarse sand

Clay content: 0 to 5 percent

Gravel content: 30 to 40 percent

Cobble content: 5 to 40 percent

Stone content: 0 to 5 percent

Reaction: Moderately acid or slightly acid

Wishbone Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Terrace escarpments
 Parent material: Calcareous glaciolacustrine sediments
 Slope range: 15 to 75 percent
 Elevation: 1,800 to 2,700 feet
 Average annual precipitation: 25 to 30 inches
 Average annual air temperature: 46 to 49 degrees F
 Frost-free period: 100 to 140 days

Taxonomic Class: Coarse-silty, mixed, superactive, mesic Lamellic Haploxeralfs

Typical Pedon

Wishbone silt loam, in an area of Wishbone-Caboose complex, 35 to 75 percent slopes, about 1.5 mile south of the Bonners Ferry Forest Ranger Station on U.S. 95, about 2,440 feet north and 2,390 feet west of the southeast corner of sec. 9, T. 61 N., R. 1 E.; 48 degrees 39 minutes 06 seconds north latitude, 116 degrees 20 minutes 25 seconds west longitude.

Oi—0 to 1 inch; needles, twigs, and grass.

Oe—1 to 2 inches; partly decomposed needles, twigs, and grass mixed with Mt. St. Helen's volcanic ash.

A—2 to 7 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine to coarse roots; many very fine and fine pores; many very fine and fine black concretions; slightly acid (pH 6.5); clear wavy boundary.

Bt—7 to 20 inches; light gray (2.5Y 7/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate thin platy and weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; many very fine to coarse roots; many very fine pores; few faint clay films on faces of peds and lining pores; many wavy lamellae $\frac{1}{16}$ - to 2-inches thick occupy 20 to 40 percent of the horizon; common very fine and fine black concretions; neutral (pH 6.6); abrupt wavy boundary.

Btk—20 to 60 inches; light gray (5Y 7/2) silt loam, olive gray (5Y 5/2) moist; massive; hard, firm, slightly sticky, slightly plastic; common very fine and fine roots; few very fine pores; few faint clay films on faces of peds and lining pores; common wavy lamellae $\frac{1}{16}$ - to 2-inches thick occupy 10 to 20 percent of the horizon; few very fine black concretions; violently effervescent; few faint lime

veins and masses between lamellae; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 47 to 49 degrees F

Average summer soil temperature: 56 to 60 degrees F with an O horizon

Moisture control section: Dry 45 to 60 days (August to September); moist October through July

Very thin light gray volcanic ash layer: $\frac{1}{4}$ - to $\frac{1}{2}$ -inch thick present in most undisturbed pedons between the organic and upper mineral layer and also a thin dark grayish brown A horizon about 1-inch thick

A horizon

Hue: 10YR, 2.5Y, or 5Y

Texture: Silt loam, silt, or very fine sandy loam

Clay content: 2 to 12 percent

Thickness: 5 to 10 inches

Reaction: Slightly acid or neutral

BA horizon (present in some pedons)

Hue: 10YR or 2.5Y

Chroma: 2 or 3 dry or moist

Thickness: 6 to 10 inches

Texture: Silt loam, silt, or very fine sandy loam

Bt horizon

Hue: 2.5Y or 5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3 dry or moist

Texture: Silt loam, silt, or very fine sandy loam

Clay content: 5 to 17 percent

Lamellae: $\frac{1}{16}$ - to 3-inches thick; occupy 10 to 40 percent of the horizon; 10YR or 7.5YR 5/4, 6/4 dry

Reaction: Slightly acid to slightly alkaline

Btk horizon

Hue: 5Y or 2.5Y

Value: 7 or 8 dry; 5 or 6 moist

Texture: Silt loam, very fine sandy loam, or silt

Clay content: 5 to 17 percent

Effervescence: Strongly or violently; few to common, faint or distinct lime veins and masses

Calcium carbonate equivalent: 10 to 15 percent

Reaction: Moderately alkaline

Bk horizon (present in some pedons)

Hue: 5Y or 2.5Y

Value: 7 or 8 dry; 5 or 6 moist

Texture: Silt loam or very fine sandy loam

Calcium carbonate: Common to many, distinct lime veins and splotches

C horizon (present in some pedons)

Hue: 5Y or 2.5Y

Texture: Silt loam or very fine sandy loam

Zee Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Landform: Foothills, foothills, and benches

Parent material: Glacial till derived from granite, gneiss, and schist with a thick mantle of volcanic ash

Slope range: 2 to 35 percent

Elevation: 2,100 to 3,800 feet

Average annual precipitation: 30 to 40 inches

Average annual air temperature: 42 to 45 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Ashy over loamy, glassy over mixed, superactive, frigid Alfic Udivitrands

Typical Pedon

Zee ashy silt loam, 2 to 15 percent slopes, about 4 miles northwest of Naples, about 1,750 feet north and 2,200 feet west of the southeast corner of sec. 33, T. 61 N., R. 1 W.; 48 degrees 35 minutes 40 seconds north latitude, 116 degrees 28 minutes 23 seconds west longitude.

Oi—0 to 2 inches; needles, leaves, moss, and twigs.

A—2 to 3 inches; dark grayish brown (10YR 4/2) ashy silt loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine roots; many very fine tubular pores; moderately acid (pH 5.6); abrupt wavy boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/4) ashy silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine roots; many very fine tubular pores; slightly acid (pH 6.2); clear wavy boundary.

Bw2—7 to 16 inches; brownish yellow (10YR 6/6) ashy silt loam, dark yellowish brown (10YR 4/6) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few fine and common very fine roots; many very fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2Bt1—16 to 24 inches; very pale brown (10YR 7/4) loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky

structure; hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; few fine and many very fine tubular pores; common faint clay films on faces of peds and bridging mineral grains; many faint and few distinct silt coats on faces of peds that are pale brown (10YR 6/3) moist; 10 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

2Bt2—24 to 30 inches; brownish yellow (10YR 6/6) loam, dark yellowish brown (10YR 4/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few fine and common very fine tubular pores; few faint clay films bridging mineral grains; few faint and distinct silt coats on faces of peds that are pale brown (10YR 6/3) moist; 10 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

2BC—30 to 60 inches; pale yellow (2.5Y 7/4) cobbly loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few fine and common very fine tubular pores; few faint clay films bridging mineral grains; many faint and few distinct silt coats on faces of peds that are light olive brown (2.5Y 5/3) moist; 5 percent gravel and 15 percent cobbles; strongly acid (pH 5.5).

Range in Characteristics

Average annual soil temperature: 43 to 45 degrees F

Average summer soil temperature: 48 to 52 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Depth to bedrock: More than 60 inches

Volcanic ash mantle: 14- to 18-inches thick

Volcanic glass content: 30 to 65 percent

Phosphate retention: 55 to 90 percent

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3 dry or moist

Clay content: 2 to 5 percent

Rock fragments: 0 to 5 percent

Moist bulk density: .65 to .85 g/cm³

Reaction: Very strongly acid to moderately acid

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 4 or 6 dry or moist

Clay content: 2 to 5 percent

Gravel content: 0 to 10 percent

Cobble content: 0 to 5 percent

Moist bulk density: .65 to .85 g/cm³

Reaction: Slightly acid or neutral

2Bt horizons

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3, 4, or 6 dry or moist
 Texture: Loam, gravelly loam, or gravelly sandy loam
 Clay content: 18 to 22 percent
 Gravel content: 0 to 20 percent
 Cobble content: 0 to 10 percent
 Reaction: Moderately acid or slightly acid

2BC horizon

Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 3 or 4 dry or moist
 Texture: Cobbly loam, gravelly loam, cobbly sandy loam, or gravelly sandy loam
 Clay content: 15 to 20 percent
 Gravel content: 5 to 20 percent
 Cobble content: 0 to 15 percent
 Reaction: Strongly acid to slightly acid

Zioncreek Series

Depth class: Very deep (more than 60 inches)
 Drainage class: Well drained
 Landform: Terraces
 Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash mixed in surface layers
 Slope range: 0 to 15 percent
 Elevation: 2,100 to 2,400 feet
 Average annual precipitation: 25 to 30 inches
 Average annual air temperature: 42 to 45 degrees F
 Frost-free period: 100 to 135 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Vitrandic Hapludalfs

Typical Pedon

Zioncreek ashy silt loam, in an area of Zioncreek-Porthill complex, 2 to 8 percent slopes, about 5.5 miles southeast of Porthill, about 300 feet south and 1,700 feet west of the northeast corner of sec. 36, T. 65 N., R. 1 W.; 48 degrees 57 minutes 07 seconds north latitude, 116 degrees 24 minutes 01 seconds west longitude.

Ap1—0 to 5 inches; pale brown (10YR 6/3) ashy silt loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine and common fine tubular pores; neutral (pH 7.0); gradual wavy boundary.

Ap2—5 to 9 inches; pale brown (10YR 6/3) ashy silt loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; common fine and medium and many very fine tubular pores; neutral (pH 7.0); clear wavy boundary.

Bt1—9 to 19 inches; mixed light yellowish brown (2.5Y 6/3) and very pale brown (10YR 7/3) silty clay loam, mixed olive brown (2.5Y 4/3) and brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine and medium and common very fine roots; few fine and common very fine tubular pores; common distinct clay films on surfaces of peds and lining pores; common distinct silt coats on surfaces of peds; neutral (pH 7.2); gradual wavy boundary.

Bt2—19 to 27 inches; mixed pale brown (10YR 6/3) and light yellowish brown (2.5Y 6/3) silty clay loam, mixed brown (10YR 4/3) and olive brown (2.5Y 4/3) moist; weak coarse angular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine and medium and common very fine roots; few fine and common very fine tubular pores; common distinct clay films on surfaces of peds and lining pores; common distinct silt coats on surfaces of peds; neutral (pH 7.2); clear wavy boundary.

Bk—27 to 34 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure parting to weak fine and medium platy; slightly hard, friable, moderately sticky, moderately plastic; few fine and medium and common very fine roots; common very fine tubular pores; violently effervescent; many medium and coarse lime seams and masses; moderately alkaline (pH 8.0); clear wavy boundary.

C1—34 to 52 inches; pale yellow (2.5Y 7/3) stratified silt loam and silty clay loam, light olive brown (2.5Y 5/3) moist; weak medium and thick platy structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

C2—52 to 60 inches; light gray (5Y 7/2) silty clay loam, olive gray (5Y 5/2) moist; strong medium and thick platy structure; hard, firm, moderately sticky, moderately plastic; few very fine tubular pores; slightly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Average annual soil temperature: 43 to 46 degrees F

Average summer soil temperature: 52 to 56 degrees F with an O horizon

Moisture control section: Dry 15 to 30 days (August to September); moist September through July

Depth to secondary calcium carbonates: 24 to 40 inches

Volcanic ash influence: 7- to 15-inches thick

Volcanic glass content: 5 to 20 percent

Moist bulk density: 1 to 1.2 g/cm³

Phosphate retention: 25 to 55 percent

Ap horizons

Value: 6 or 7 dry; 4 or 5 moist

Clay content: 10 to 18 percent

Reaction: Slightly acid or neutral

A horizon (present in undisturbed pedons)

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2 dry or moist

Thickness: 1 or 2 inches

Reaction: Slightly acid or neutral

BA horizon (present in some pedons)

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Reaction: Slightly acid or neutral

Bt horizons

Hue: 2.5Y, 10YR, or 5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3 or 4 dry or moist

Texture: Silt loam or silty clay loam

Clay content: 18 to 34 percent

Lamellae: 1/16- to 1-inch thick; present in some pedons

Reaction: Slightly acid or neutral

Btk horizon (present in some pedons)

Texture: Silt loam or silty clay loam

Calcium carbonate: Lime in soft masses, seams, and hard concretions

Bk horizon

Hue: 2.5Y or 5Y

Value: 7 or 8 dry; 5 or 6 moist

Chroma: 2 or 3 dry or moist

Texture: Silt loam or silty clay loam

Clay content: 18 to 34 percent

Effervescence: Strongly to violently

Calcium carbonate equivalent: 10 to 15 percent

Calcium carbonate: Lime in soft masses, seams, and hard concretions

Reaction: Moderately alkaline

C horizon (absent in some pedons)

Hue: 2.5Y or 5Y

Chroma: 2 or 3 dry or moist

Texture: Stratified silt loam, silty clay loam, or very fine sandy loam

Clay content: 10 to 32 percent

Effervescence: Slightly to strongly

Calcium carbonate equivalent: 5 to 10 percent

Reaction: Moderately alkaline

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, each map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. A map unit is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Level to undulating, poorly drained to moderately well-drained soils on flood plains and drainageways

1—Schnoorson-DeVoignes-Farnhamton

Percentage of survey area: 16

Very deep, level to undulating, poorly drained to moderately well-drained soils that formed in alluvium derived from mixed sources and, in some areas, organic material

Setting

Landscape: Flood plains
Slope range: 0 to 5 percent
Elevation: 1,750 to 1,800 feet
Average annual air temperature: 43 to 47 degrees F
Frost-free days: 100 to 140
Average annual precipitation: 23 to 28 inches

Composition

Major components: Schnoorson, DeVoignes, and Farnhamton soils

Minor components: Ritz, Pywell, Bane, Riverwash, and Seelovers soils

Use

Present uses: Cropland, hay and pasture, recreation, and wildlife habitat; some areas: homesites

Limitations of use: Flooding (rare if protected), wetness, soil piping, and frost action; some areas: subsidence, percs slowly, low soil strength, shrink-swell, and ponding

2—Seelovers-Typic Fluvaquents-Aquic Udifluvents

Percentage of survey area: 2

Very deep, level to undulating, poorly drained and somewhat poorly drained soils that formed in alluvium derived from mixed sources

Setting

Landscape: Flood plains and drainageways
Slope range: 0 to 4 percent
Elevation: 1,800 to 3,000 feet
Average annual air temperature: 42 to 46 degrees F
Frost-free days: 80 to 120
Average annual precipitation: 24 to 35 inches

Composition

Major components: Seelovers, Typic Fluvaquents, and Aquic Udifluvents soils

Minor components: Pywell, DeVoignes, Riverwash, and Rubson soils

Use

Present uses: Hay and pasture, recreation, and wildlife habitat

Limitations of use: Flooding, wetness, soil piping, frost action; some areas: percs slowly and low soil strength

Nearly level to hilly, well-drained, moderately well-drained, and excessively drained soils on old glacial lake laid or glacial outwash terraces or benches

3—Rubson-Porthill-Frycanyon

Percentage of survey area: 17

Very deep, nearly level to rolling, well-drained and moderately well-drained soils that formed in glacial lake laid sediments with minor amounts of volcanic ash in surface

Setting

Landscape: Old glacial lake laid terraces or benches
Slope range: 0 to 15 percent
Elevation: 2,000 to 2,700 feet
Average annual air temperature: 42 to 45 degrees F
Frost-free days: 100 to 135
Average annual precipitation: 25 to 30 inches

Composition

Major components: Rubson, Porthill, and Frycanyon soils

Minor components: Zioncreek, Selle, Stien, Seelovers, and Zee soils

Use

Present uses: Timber production, cropland, hay and pasture, homesites, recreation, and wildlife habitat

Limitations of use: Water erosion, low soil strength, frost action; some areas: percs slowly, rooting depth, and seasonal wetness

4—Selle-Elmira

Percentage of survey area: 8

Very deep, nearly level to hilly, well-drained and excessively drained soils that formed in sandy glacial lake laid sediments with minor amounts of volcanic ash in surface

Setting

Landscape: Glacial lake laid terraces and dunes
Slope range: 0 to 35 percent
Elevation: 2,000 to 2,500 feet
Average annual air temperature: 43 to 47 degrees F
Frost-free days: 100 to 140
Average annual precipitation: 25 to 30 inches

Composition

Major components: Selle and Elmira soils

Minor components: Rubson, Dodgecreek, Myrtle creek, and Snowlake soils

Use

Present uses: Timber production, cropland, hay and pasture, homesites, recreation, and wildlife habitat

Limitations of use: Soil blowing, droughtiness, sandy textures, seepage, and cutbanks cave; some areas: slope

5—Stien-Pend Oreille

Percentage of survey area: 3

Very deep, nearly level to rolling, well-drained soils that formed in glacial outwash and till with a thick mantle of volcanic ash

Setting

Landscape: Terraces or benches
Slope range: 0 to 15 percent
Elevation: 1,800 to 2,800 feet
Average annual air temperature: 42 to 45 degrees F
Frost-free days: 90 to 110
Average annual precipitation: 25 to 32 inches

Composition

Major components: Stien and Pend Oreille soils

Minor components: Idamont, Dufort, Treble, Caribouridge, and Snowlake soils

Use

Present uses: Timber production, hay and pasture, homesites, recreation, and wildlife habitat

Limitations of use: Large stones and seepage; some areas: droughtiness, cutbanks cave, sandy textures, and frost action

Steep and very steep, well-drained soils on terrace escarpments and canyonsides

6—Wishbone-Caboose-Crash

Percentage of survey area: 9

Very deep, steep and very steep, well-drained soils that formed in silty, calcareous, glacial lake laid sediments

Setting

*Landscape: Terraces and escarpments
Slope range: 35 to 75 percent
Elevation: 1,800 to 2,700 feet
Average annual air temperature: 42 to 49 degrees F
Frost-free days: 80 to 140
Average annual precipitation: 23 to 28 inches*

Composition

Major components: Crash, Wishbone, and Caboose soils

Minor components: Artnoc, Elmira, Rubson, Flemingcreek, Pend Oreille, and Treble soils

Use

Present uses: Timber production, livestock grazing, recreation, and wildlife habitat

Limitations of use: Slope, water erosion, soil slippage, and frost action

Strongly sloping to very steep, well-drained soils on foothills and mountains

7—Pend Oreille-Idamont-Treble

Percentage of survey area: 37

Very deep, strongly sloping to very steep, well-drained soils that formed in glacial till with a mantle of volcanic ash

Setting

*Landscape: Foothills and mountains
Slope range: 5 to 65 percent*

*Elevation: 2,200 to 4,900 feet
Average annual air temperature: 42 to 46 degrees F
Frost-free days: 70 to 130
Average annual precipitation: 25 to 45 inches*

Composition

Major components: Pend Oreille, Idamont, and Treble soils

Minor components: Caribouridge, Rock outcrop, Dufort, Dodgecreek, and Pearsoncreek soils

Use

Present uses: Timber production, livestock grazing, recreation, wildlife habitat, and watershed

Limitations of use: Slope, seepage; some areas: rock outcrop, large stones, frost action, and droughtiness

8—Rock outcrop-McArthur-Jaypeak

Percentage of survey area: 3

Very deep, steep to very steep, well-drained soils that formed in weathered material derived from schist bedrock with a mantle of volcanic ash, and with areas of rock outcrop

Setting

*Landscape: Mountains and breaklands
Slope range: 35 to 100 percent
Elevation: 2,400 to 4,800 feet
Average annual air temperature: 42 to 46 degrees F
Frost-free days: 80 to 120
Average annual precipitation: 30 to 45 inches*

Composition

Major components: McArthur, Rock outcrop, and Jaypeak soils

Minor components: Treble, Dufort, Idamont, and Pend Oreille soils

Use

Present uses: Timber production, recreation, wildlife habitat, and watershed

Limitations of use: Slope, large stones, and rock outcrop; some areas: droughtiness and water erosion

9—Rubycreek-Redraven-Baldeagle

Percentage of survey area: 3

Very deep, moderately steep to very steep, well-drained, cold soils that formed in glacial till and weathered material derived from granite and gneiss bedrock with a mantle of volcanic ash

Setting

Landscape: Mountains, ridgetops, and lateral moraines at high elevations

Slope range: 15 to 75 percent

Elevation: 4,800 to 6,000 feet

Average annual air temperature: 38 to 42 degrees F

Frost-free days: 30 to 60

Average annual precipitation: 45 to 60 inches

Composition

Major components: Rubycreek, Redraven, and Baldeagle soils

Minor components: Rock outcrop, Roman, and Katka soils

Use

Present uses: Timber production, wildlife habitat, recreation, and watershed

Limitations of use: Slope, large stones, frost action, cold temperatures, and short growing season; some areas: rock outcrop and seepage

Detailed Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and, consequently, they are not mentioned in the descriptions, especially

where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all of the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Idamont ashly silt loam, 15 to 35 percent slopes, is a phase of the Idamont series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes *complexes*. They consist of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Selle-Elmira complex, 0 to 20 percent slopes, is an example.

This survey includes *miscellaneous areas*. They have little or no soil material and support little or no vegetation. Rock outcrop is an example.

The “Acreage and Proportionate Extent of the Soils” table in Parts I and II of the manuscript gives the acreage and proportionate extent of each map unit. Other tables (see “Summary of Tables”) give properties of the soils and the limitations, capabilities, and potentials for many uses. Many of the terms used in describing the soils or miscellaneous areas are defined in the “Glossary.”

101—Dufort-Rock outcrop-Kriest complex, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 3,800 feet

Mean annual precipitation: 25 to 35 inches

Frost-free period: 90 to 120 days

Component Description

Dufort and similar soils

Composition: 45 percent

Geomorphic description:

- Side slopes on hills
- Backslopes on mountains

Slope: 35 to 65 percent, southeast to west aspects

Elevation: 1,800 to 3,800 feet

Effective annual precipitation: 25 to 35 inches

Frost-free period: 90 to 120 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 4.8 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; ashy silt loam

Bw1—3 to 9 inches; ashy silt loam

Bw2—9 to 18 inches; gravelly ashy silt loam

2Bt1—18 to 25 inches; very gravelly sandy loam

2Bt2—25 to 36 inches; very cobbly sandy loam

2Bt3—36 to 47 inches; very cobbly sandy loam

2Bt4—47 to 52 inches; very cobbly fine sandy loam

2C—52 to 60 inches; extremely stony sandy loam

Rock outcrop

Composition: 25 percent

Definition: Rock outcrop consists of exposures of bare bedrock.

Geomorphic description:

- Hills
- Mountains
- Ridges

Kriest and similar soils

Composition: 20 percent

Geomorphic description:

- Side slopes on hills
- Backslopes on mountains
- Ridges

Slope: 35 to 65 percent, southeast to west aspects

Elevation: 1,800 to 3,800 feet

Effective annual precipitation: 25 to 35 inches

Frost-free period: 90 to 120 days

Surface layer texture: Gravelly ashy sandy loam

Depth to restrictive feature: None noted

Bedrock (paralithic): 40 to 60 inches

Drainage class: Well drained

Parent material: Glacial till and residuum derived from granite, gneiss, and schist rocks with minor amounts of loess and volcanic ash in the surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 3.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 4 inches; gravelly ashy sandy loam

Bw1—4 to 8 inches; gravelly ashy sandy loam

Bw2—8 to 18 inches; gravelly ashy sandy loam

Bt1—18 to 27 inches; gravelly sandy loam

Bt2—27 to 34 inches; gravelly sandy loam

BC—34 to 43 inches; gravelly loamy sand

2Cr—43 to 60 inches; weathered bedrock

Additional Components

Idamont and similar soils: 4 percent

Treble and similar soils: 4 percent

Dufort, very stony and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

102—Caboose-Wishbone complex, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 2,400 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 100 to 140 days

Component Description

Caboose and similar soils

Composition: 50 percent

Geomorphic description: Escarpments

Slope: 15 to 35 percent, southeast to west aspects

Elevation: 1,800 to 2,400 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 100 to 130 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Calcareous glaciolacustrine sediments

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 10.4 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material

A—1 to 5 inches; silt loam

AB1—5 to 9 inches; silt loam

AB2—9 to 21 inches; silt loam

Bt1—21 to 35 inches; silt loam

Bt2—35 to 57 inches; silt loam

Bk—57 to 60 inches; silt loam

Wishbone and similar soils

Composition: 35 percent

Geomorphic description: Escarpments

Slope: 15 to 35 percent, south to southwest aspects

Elevation: 1,800 to 2,400 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 110 to 140 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Calcareous glaciolacustrine sediments

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 11.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 7 inches; silt loam

Bt—7 to 20 inches; silt loam

Btk—20 to 60 inches; silt loam

Additional Components

Artnoc and similar soils: 5 percent

Flemingcreek and similar soils: 5 percent

Rubson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

103—Artnoc silt loam, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 2,700 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 90 to 120 days

Component Description

Artnoc and similar soils

Composition: 85 percent

Geomorphic description: Escarpments

Slope: 35 to 75 percent, east to west aspects

Elevation: 1,800 to 2,700 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 90 to 120 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Silty glaciolacustrine sediments

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 11.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 4 inches; silt loam

AB—4 to 8 inches; silt loam

Bt1—8 to 18 inches; silt loam

Bt2—18 to 33 inches; silt loam

C—33 to 60 inches; silt loam

Additional Components

Caboose and similar soils: 5 percent
 Crash and similar soils: 5 percent
 Flemingcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

104—Baldeagle gravelly medial silt loam, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 4,800 to 6,000 feet
Mean annual precipitation: 45 to 60 inches
Frost-free period: 30 to 90 days

Component Description

Baldeagle and similar soils

Composition: 85 percent
Geomorphic description: Backslopes on mountains
Slope: 35 to 75 percent, northwest to northeast aspects
Elevation: 4,800 to 6,000 feet
Effective annual precipitation: 45 to 60 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly medial silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over residuum weathered from granite and gneiss bedrock
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.5 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; gravelly medial silt loam
 Bw1—3 to 7 inches; gravelly medial silt loam
 Bw2—7 to 14 inches; gravelly medial silt loam
 Bw3—14 to 20 inches; cobbly medial silt loam
 2BC—20 to 36 inches; extremely stony sandy loam
 2C—36 to 60 inches; extremely stony sandy loam

Additional Components

Rock outcrop: 5 percent
 Jaypeak and similar soils: 3 percent

Redraven, bouldery and similar soils: 3 percent
 Baldeagle, very stony and similar soils: 2 percent
 Katka, very bouldery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

105—Bane loamy fine sand, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,750 to 2,000 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 90 to 140 days

Component Description

Bane and similar soils

Composition: 85 percent
Geomorphic description: Alluvial fans
Slope: 2 to 8 percent
Elevation: 1,750 to 2,000 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days
Surface layer texture: Loamy fine sand
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 A—1 to 6 inches; loamy fine sand
 C1—6 to 25 inches; gravelly sand
 2C2—25 to 39 inches; fine sand
 3Ab—39 to 43 inches; gravelly loamy fine sand
 4C3—43 to 60 inches; very gravelly sand

Additional Components

Aquic Udifluvents and similar soils: 5 percent
 Bane, extremely stony and similar soils: 5 percent
 Farnhamton, unprotected, undrained and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**106—Caribouridge ashy silt loam,
0 to 15 percent slopes****Map Unit Setting***Interpretive focus:* Forestland*Field investigation intensity:* Order 2*Elevation:* 2,400 to 4,800 feet*Mean annual precipitation:* 30 to 45 inches*Frost-free period:* 70 to 100 days**Component Description****Caribouridge and similar soils***Composition:* 85 percent*Geomorphic description:* Footslopes on hills*Slope:* 0 to 15 percent*Elevation:* 2,400 to 4,800 feet*Effective annual precipitation:* 30 to 45 inches*Frost-free period:* 70 to 100 days*Surface layer texture:* Ashy silt loam*Depth to restrictive feature:* None noted*Drainage class:* Well drained*Parent material:* Glacial till and outwash with a thick mantle of volcanic ash*Native plant cover type:* Forestland*Flooding:* None*Available water capacity:* Mainly 4.6 inches**Typical Profile**

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; ashy silt loam

Bw1—3 to 9 inches; ashy silt loam

Bw2—9 to 18 inches; ashy silt loam

2BC—18 to 23 inches; very cobbly loamy coarse sand

2C1—23 to 44 inches; extremely cobbly coarse sand

2C2—44 to 60 inches; extremely cobbly coarse sand

Additional Components

Dodgecreek and similar soils: 5 percent

Pend Oreille and similar soils: 5 percent

Idamont and similar soils: 3 percent

Highfalls and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**107—Caribouridge ashy silt loam,
15 to 35 percent slopes****Map Unit Setting***Interpretive focus:* Forestland*Field investigation intensity:* Order 2*Elevation:* 2,400 to 4,800 feet*Mean annual precipitation:* 30 to 45 inches*Frost-free period:* 70 to 100 days**Component Description****Caribouridge and similar soils***Composition:* 85 percent*Geomorphic description:*

• Side slopes on hills

• Backslopes on mountains

Slope: 15 to 35 percent, northwest to northeast aspects*Elevation:* 2,400 to 4,800 feet*Effective annual precipitation:* 30 to 45 inches*Frost-free period:* 70 to 100 days*Surface layer texture:* Ashy silt loam*Depth to restrictive feature:* None noted*Drainage class:* Well drained*Parent material:* Glacial till with a thick mantle of volcanic ash*Native plant cover type:* Forestland*Flooding:* None*Available water capacity:* Mainly 4.6 inches**Typical Profile**

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; ashy silt loam

Bw1—3 to 9 inches; ashy silt loam

Bw2—9 to 18 inches; ashy silt loam

2BC—18 to 23 inches; very cobbly loamy coarse sand

2C1—23 to 44 inches; extremely cobbly coarse sand

2C2—44 to 60 inches; extremely cobbly coarse sand

Additional Components

Idamont and similar soils: 5 percent

Pend Oreille and similar soils: 5 percent

Highfalls and similar soils: 3 percent

Dodgecreek and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

108—Caribouridge ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,400 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 70 to 110 days

Component Description

Caribouridge and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 35 to 65 percent, northwest to northeast aspects
Elevation: 2,400 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 18 inches; ashy silt loam
 2BC—18 to 23 inches; very cobbly loamy coarse sand
 2C1—23 to 44 inches; extremely cobbly coarse sand
 2C2—44 to 60 inches; extremely cobbly coarse sand

Additional Components

Idamont and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent
 Myrtle Creek and similar soils: 3 percent
 Caribouridge, very bouldery and similar soils: 1 percent
 Vitrandic Dystrudepts and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

109—Caribouridge, warm-Rock outcrop complex, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 3,800 to 5,000 feet
Mean annual precipitation: 35 to 50 inches
Frost-free period: 70 to 100 days

Component Description

Caribouridge, warm and similar soils

Composition: 60 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 15 to 35 percent, southeast to southwest aspects
Elevation: 3,800 to 5,000 feet
Effective annual precipitation: 35 to 50 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 18 inches; ashy silt loam
 2BC—18 to 23 inches; very cobbly loamy coarse sand
 2C1—23 to 44 inches; extremely cobbly coarse sand
 2C2—44 to 60 inches; extremely cobbly coarse sand

Rock outcrop

Composition: 25 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains

Additional Components

Idamont and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent
 Pearsoncreek and similar soils: 2 percent
 Snowlake and similar soils: 2 percent
 Caribouridge, very bouldery and similar soils:
 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

110—Crash silt loam, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,800 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 80 to 110 days

Component Description

Crash and similar soils

Composition: 85 percent
Geomorphic description: Escarpments
Slope: 35 to 75 percent, northwest to northeast aspects
Elevation: 1,800 to 2,700 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 80 to 110 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Silty calcareous glaciolacustrine sediments
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 11.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A1—2 to 3 inches; silt loam
 A2—3 to 5 inches; silt loam
 AB—5 to 9 inches; silt loam
 Bt1—9 to 13 inches; silt loam
 Bt2—13 to 20 inches; silt loam
 Bt3—20 to 29 inches; silt loam
 Bk—29 to 60 inches; silt loam

Additional Components

Artnoc and similar soils: 5 percent
 Caboose and similar soils: 5 percent
 Flemingcreek and similar soils: 3 percent
 Wishbone and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

112—Crash-Artnoc complex, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,800 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 80 to 120 days

Component Description

Crash and similar soils

Composition: 50 percent
Geomorphic description: Escarpments
Slope: 35 to 75 percent, northwest to northeast aspects
Elevation: 1,800 to 2,700 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 80 to 110 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Silty calcareous glaciolacustrine sediments
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 11.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A1—2 to 3 inches; silt loam
 A2—3 to 5 inches; silt loam
 AB—5 to 9 inches; silt loam
 Bt1—9 to 13 inches; silt loam
 Bt2—13 to 20 inches; silt loam
 Bt3—20 to 29 inches; silt loam
 Bk—29 to 60 inches; silt loam

Artnoc and similar soils

Composition: 35 percent
Geomorphic description: Escarpments

Slope: 35 to 75 percent, east to west aspects
Elevation: 1,800 to 2,700 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 120 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Silty glaciolacustrine sediments
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 11.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 4 inches; silt loam
 AB—4 to 8 inches; silt loam
 Bt1—8 to 18 inches; silt loam
 Bt2—18 to 33 inches; silt loam
 C—33 to 60 inches; silt loam

Additional Components

Caboose and similar soils: 5 percent
 Flemingcreek and similar soils: 5 percent
 Wishbone and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

113—Caribouridge, warm-Rock outcrop complex, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 3,800 to 5,000 feet
Mean annual precipitation: 35 to 50 inches
Frost-free period: 70 to 100 days

Component Description

Caribouridge, warm and similar soils

Composition: 60 percent
Geomorphic description: Backslopes on mountains
Slope: 35 to 65 percent, southeast to southwest aspects
Elevation: 3,800 to 5,000 feet
Effective annual precipitation: 35 to 50 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained

Parent material: Glacial till with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 18 inches; ashy silt loam
 2BC—18 to 23 inches; very cobbly loamy coarse sand
 2C1—23 to 44 inches; extremely cobbly coarse sand
 2C2—44 to 60 inches; extremely cobbly coarse sand

Rock outcrop

Composition: 25 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description: Mountains

Additional Components

Idamont and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent
 Pearsoncreek and similar soils: 2 percent
 Snowlake and similar soils: 2 percent
 Caribouridge, very bouldery and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

114—Dufort ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,400 to 3,800 feet
Mean annual precipitation: 30 to 35 inches
Frost-free period: 90 to 120 days

Component Description

Dufort and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 35 to 65 percent, southeast to west aspects

Elevation: 2,400 to 3,800 feet
Effective annual precipitation: 30 to 35 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 18 inches; gravelly ashy silt loam
 2Bt1—18 to 25 inches; very gravelly sandy loam
 2Bt2—25 to 36 inches; very cobbly sandy loam
 2Bt3—36 to 47 inches; very cobbly sandy loam
 2Bt4—47 to 52 inches; very cobbly fine sandy loam
 2C—52 to 60 inches; extremely stony sandy loam

Additional Components

Idamont and similar soils: 5 percent
 Treble and similar soils: 5 percent
 Dufort, very bouldery and similar soils: 3 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

115—DeVoignes mucky silt loam, protected, drained, 0 to 1 percent slopes

Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 90 to 120 days

Component Description

DeVoignes, protected, drained and similar soils
Composition: 85 percent

Geomorphic description:

- Depressions
- Flood plains
- Swales

Slope: 0 to 1 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 90 to 120 days
Surface layer texture: Mucky silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Mixed alluvium stratified with organic layers in the upper part
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.7 inches

Typical Profile

Ap—0 to 9 inches; mucky silt loam
 Oa/C—9 to 19 inches; stratified muck to silty clay loam
 Oa/Cg—19 to 24 inches; stratified muck to silty clay loam
 2Cg1—24 to 28 inches; silty clay loam
 2Cg2—28 to 41 inches; silty clay loam
 2Cg3—41 to 65 inches; stratified silty clay loam to silty clay

Additional Components

Pywell, protected, drained and similar soils: 5 percent
 Ritz, protected, drained and similar soils: 5 percent
 Schnoorson, protected, drained and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

116—Dufort ashy silt loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,300 to 3,800 feet
Mean annual precipitation: 30 to 35 inches
Frost-free period: 90 to 120 days

Component Description

Dufort and similar soils
Composition: 85 percent

Geomorphic description:

- Side slopes on hills
- Backslopes on mountains

Slope: 15 to 35 percent, southeast to west aspects
Elevation: 2,300 to 3,800 feet
Effective annual precipitation: 30 to 35 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 18 inches; gravelly ashy silt loam
 2Bt1—18 to 25 inches; very gravelly sandy loam
 2Bt2—25 to 36 inches; very cobbly sandy loam
 2Bt3—36 to 47 inches; very cobbly sandy loam
 2Bt4—47 to 52 inches; very cobbly fine sandy loam
 2C—52 to 60 inches; extremely stony sandy loam

Additional Components

Idamont and similar soils: 5 percent
 Treble and similar soils: 5 percent
 Dufort, very bouldery and similar soils: 3 percent
 Rock outcrop: 1 percent
 Stien and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**117—Dodgecreek ashy silt loam,
 2 to 12 percent slopes**
Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 3,000 to 4,900 feet
Mean annual precipitation: 35 to 45 inches
Frost-free period: 80 to 110 days

Component Description**Dodgecreek and similar soils**

Composition: 85 percent
Geomorphic description: Outwash terraces
Slope: 2 to 12 percent
Elevation: 3,000 to 4,900 feet
Effective annual precipitation: 35 to 45 inches
Frost-free period: 80 to 110 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy glacial outwash with a thin mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 7 inches; ashy silt loam
 Bw2—7 to 10 inches; ashy loam
 2BC1—10 to 14 inches; sandy loam
 2BC2—14 to 19 inches; loamy sand
 2C1—19 to 47 inches; coarse sand
 2C2—47 to 62 inches; coarse sand

Additional Components

Caribouridge and similar soils: 5 percent
 Myrtlecreek and similar soils: 5 percent
 Snowlake and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**118—Farnhamton silt loam, protected,
 drained, 2 to 5 percent slopes**
Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days

Component Description

Farnhamton, protected, drained and similar soils

Composition: 90 percent

Geomorphic description:

- Flood plains
- Natural levees

Slope: 2 to 5 percent

Elevation: 1,750 to 1,800 feet

Effective annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Moderately well drained

Parent material: Calcareous alluvium

Flooding: Rare

Water table: Present

Available water capacity: Mainly 11.3 inches

Typical Profile

Ap—0 to 7 inches; silt loam

AC—7 to 11 inches; silt loam

C1—11 to 22 inches; silt loam

C2—22 to 40 inches; silt loam

C3—40 to 60 inches; silt loam

Additional Components

Ritz, protected, drained and similar soils: 5 percent

Schnoorson, protected, drained and similar soils:
5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

119—Farnhamton silt loam, unprotected, undrained, 0 to 4 percent slopes

Map Unit Setting

Interpretive focus: Native pastureland

Field investigation intensity: Order 2

Elevation: 1,750 to 1,800 feet

Mean annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Component Description

Farnhamton, unprotected, undrained and similar soils

Composition: 85 percent

Geomorphic description:

- Flood plains
- Natural levees

Slope: 0 to 4 percent

Elevation: 1,750 to 1,800 feet

Effective annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Moderately well drained

Parent material: Calcareous alluvium

Flooding: Occasional

Water table: Present

Available water capacity: Mainly 11.3 inches

Typical Profile

A—0 to 7 inches; silt loam

AC—7 to 11 inches; silt loam

C1—11 to 22 inches; silt loam

C2—22 to 40 inches; silt loam

C3—40 to 60 inches; silt loam

Additional Components

Ritz, unprotected, undrained and similar soils:
5 percent

Riverwash: 5 percent

Schnoorson, unprotected, undrained and similar
soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

120—Dufort ashy silt loam, 5 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,300 to 3,200 feet

Mean annual precipitation: 30 to 35 inches

Frost-free period: 90 to 120 days

Component Description

Dufort and similar soils

Composition: 85 percent

Geomorphic description:

- Footslopes on hills
- Side slopes on hills

Slope: 5 to 15 percent, south to west aspects

Elevation: 2,300 to 3,200 feet

Effective annual precipitation: 30 to 35 inches

Frost-free period: 90 to 120 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 4.8 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; ashy silt loam

Bw1—3 to 9 inches; ashy silt loam

Bw2—9 to 18 inches; gravelly ashy silt loam

2Bt1—18 to 25 inches; very gravelly sandy loam

2Bt2—25 to 36 inches; very cobbly sandy loam

2Bt3—36 to 47 inches; very cobbly sandy loam

2Bt4—47 to 52 inches; very cobbly fine sandy loam

2C—52 to 60 inches; extremely stony sandy loam

Additional Components

Idamont and similar soils: 5 percent

Treble and similar soils: 5 percent

Pearsoncreek and similar soils: 2 percent

Stien and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

121—Katka, very bouldery-Rock outcrop complex, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 5,000 to 6,100 feet

Mean annual precipitation: 50 to 60 inches

Frost-free period: 30 to 60 days

Component Description

Katka, very bouldery and similar soils

Composition: 60 percent

Geomorphic description: Backslopes on mountains

Slope: 35 to 65 percent, southeast to southwest aspects

Elevation: 5,000 to 6,100 feet

Effective annual precipitation: 50 to 60 inches

Frost-free period: 30 to 60 days

Surface layer texture: Gravelly medial silt loam

Rock fragments on the soil surface: .1 to 3 percent boulders, 20 to 123 feet apart

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Weathered material derived from granite and gneiss bedrock, with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 4.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; gravelly medial silt loam

AB—3 to 7 inches; gravelly medial silt loam

Bw—7 to 16 inches; gravelly medial silt loam

2BC—16 to 30 inches; very stony sandy loam

2C1—30 to 44 inches; extremely stony sandy loam

2C2—44 to 60 inches; extremely stony coarse sandy loam

Rock outcrop

Composition: 30 percent

Definition: Rock outcrop consists of exposures of bare bedrock.

Geomorphic description:

- Backslopes on mountains
- Ridges

Additional Components

Baldeagle and similar soils: 5 percent

Redraven, bouldery and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

122—Highfalls stony ashy silt loam, 35 to 65 percent slopes, bouldery

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 3,800 to 5,000 feet

Mean annual precipitation: 35 to 50 inches

Frost-free period: 80 to 110 days

Component Description

Highfalls, bouldery and similar soils

Composition: 85 percent

Geomorphic description: Backslopes on mountains
Slope: 35 to 65 percent, southeast to southwest aspects

Elevation: 3,800 to 5,000 feet

Effective annual precipitation: 35 to 50 inches

Frost-free period: 80 to 110 days

Surface layer texture: Stony ashy silt loam

Rock fragments on the soil surface: .01 to .1 percent boulders, 67 to 100 feet apart

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; stony ashy silt loam

Bw1—3 to 8 inches; stony ashy silt loam

Bw2—8 to 18 inches; stony ashy silt loam

2Bt—18 to 29 inches; very gravelly sandy loam

2C—29 to 60 inches; very cobbly fine sandy loam

Additional Components

Idamont and similar soils: 5 percent

Pearsoncreek and similar soils: 5 percent

Alfic Udivitrands, dense substratum and similar soils: 3 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

123—Jaypeak gravelly ashy silt loam, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,400 to 4,800 feet

Mean annual precipitation: 30 to 45 inches

Frost-free period: 30 to 110 days

Component Description

Jaypeak and similar soils

Composition: 85 percent

Geomorphic description: Backslopes on mountains

Slope: 35 to 75 percent, northwest to northeast aspects

Elevation: 2,400 to 4,800 feet

Effective annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Surface layer texture: Gravelly ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Weathered material derived from schist, gneiss and granite bedrock, with volcanic ash mantle

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; gravelly ashy silt loam

Bw1—3 to 9 inches; gravelly ashy silt loam

Bw2—9 to 19 inches; gravelly ashy silt loam

2BC—19 to 26 inches; very gravelly loam

2C1—26 to 41 inches; extremely stony loam

2C2—41 to 53 inches; extremely gravelly loam

2C3—53 to 60 inches; extremely stony loam

Additional Components

Pend Oreille and similar soils: 5 percent

Rock outcrop: 5 percent

Idamont and similar soils: 2 percent

Baldeagle and similar soils: 1 percent

Highfalls and similar soils: 1 percent

Jaypeak, very stony and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

124—McArthur, very stony-Rock outcrop complex, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,600 to 4,800 feet

Mean annual precipitation: 30 to 45 inches

Frost-free period: 90 to 120 days

Component Description

McArthur, very stony and similar soils

Composition: 55 percent

Geomorphic description: Backslopes on mountains

Slope: 35 to 75 percent, south to west aspects
Elevation: 2,600 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days
Surface layer texture: Gravelly ashy very fine sandy loam
Rock fragments on the soil surface: .1 to 3 percent stones, 10 to 67 feet apart
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Weathered material derived from schist, gneiss and granite bedrock, with minor amounts of volcanic ash in the surface
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; gravelly ashy very fine sandy loam
 AB—3 to 9 inches; very cobbly ashy very fine sandy loam
 Bw—9 to 17 inches; very cobbly ashy very fine sandy loam
 C1—17 to 31 inches; very cobbly very fine sandy loam
 C2—31 to 45 inches; very cobbly very fine sandy loam
 C3—45 to 57 inches; very cobbly very fine sandy loam
 C4—57 to 60 inches; very cobbly very fine sandy loam

Rock outcrop

Composition: 30 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description: Backslopes on mountains

Additional Components

Dufort and similar soils: 5 percent
 Treble and similar soils: 5 percent
 Pearsoncreek and similar soils: 3 percent
 McArthur, extremely stony and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

125—Idamont ashy silt loam, 5 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,400 to 4,900 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 80 to 110 days

Component Description

Idamont and similar soils

Composition: 85 percent
Geomorphic description: Footslopes on hills
Slope: 5 to 15 percent, east to west aspects
Elevation: 2,400 to 4,900 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 80 to 110 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.2 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 3 inches; moderately decomposed plant material
 A—3 to 4 inches; ashy silt loam
 Bw1—4 to 10 inches; ashy silt loam
 Bw2—10 to 21 inches; ashy silt loam
 2Bw3—21 to 31 inches; gravelly loam
 2Bt—31 to 55 inches; gravelly sandy loam
 3C—55 to 60 inches; extremely cobbly sandy loam

Additional Components

Highfalls and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent
 Treble and similar soils: 3 percent
 Alfic Udivitrands, dense substratum and similar soils: 1 percent
 Dufort and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

126—Ildamont ashy silt loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,400 to 4,900 feet

Mean annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Component Description

Ildamont and similar soils

Composition: 85 percent

Geomorphic description:

- Side slopes on hills

- Backslopes on mountains

Slope: 15 to 35 percent, east to west aspects

Elevation: 2,400 to 4,900 feet

Effective annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 7.2 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 3 inches; moderately decomposed plant material

A—3 to 4 inches; ashy silt loam

Bw1—4 to 10 inches; ashy silt loam

Bw2—10 to 21 inches; ashy silt loam

2Bw3—21 to 31 inches; gravelly loam

2Bt—31 to 55 inches; gravelly sandy loam

3C—55 to 60 inches; extremely cobbly sandy loam

Additional Components

Highfalls and similar soils: 5 percent

Pend Oreille and similar soils: 5 percent

Treble and similar soils: 3 percent

Alfic Udivitrands, dense substratum and similar soils: 1 percent

Dufort and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

127—Ildamont ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,400 to 4,900 feet

Mean annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Component Description

Ildamont and similar soils

Composition: 85 percent

Geomorphic description: Backslopes on mountains

Slope: 35 to 65 percent, east to west aspects

Elevation: 2,400 to 4,900 feet

Effective annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 7.2 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 3 inches; moderately decomposed plant material

A—3 to 4 inches; ashy silt loam

Bw1—4 to 10 inches; ashy silt loam

Bw2—10 to 21 inches; ashy silt loam

2Bw3—21 to 31 inches; gravelly loam

2Bt—31 to 55 inches; gravelly sandy loam

3C—55 to 60 inches; extremely cobbly sandy loam

Additional Components

Highfalls and similar soils: 5 percent

Pend Oreille and similar soils: 5 percent

Treble and similar soils: 3 percent

Alfic Udivitrands, dense substratum and similar soils: 1 percent

Dufort and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

128—Myrtlecreek ashy sandy loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,300 to 4,500 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 80 to 110 days

Component Description

Myrtlecreek and similar soils

Composition: 85 percent
Geomorphic description: Terraces
Slope: 15 to 35 percent, north to east aspects
Elevation: 2,300 to 4,500 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 80 to 110 days
Surface layer texture: Ashy sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material
 A—1 to 2 inches; ashy sandy loam
 Bw1—2 to 8 inches; ashy sandy loam
 Bw2—8 to 14 inches; ashy sandy loam
 C1—14 to 19 inches; loamy sand
 C2—19 to 33 inches; sand
 C3—33 to 41 inches; coarse sand
 C4—41 to 49 inches; coarse sand
 C5—49 to 60 inches; sand

Additional Components

Dodgecreek and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent
 Vitrandic Dystrudepts and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

129—Myrtlecreek ashy sandy loam, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,300 to 4,500 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 80 to 110 days

Component Description

Myrtlecreek and similar soils

Composition: 85 percent
Geomorphic description:
 • Backslopes on canyons
 • Escarpments
Slope: 35 to 75 percent, north to east aspects
Elevation: 2,300 to 4,500 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 80 to 110 days
Surface layer texture: Ashy sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material
 A—1 to 2 inches; ashy sandy loam
 Bw1—2 to 8 inches; ashy sandy loam
 Bw2—8 to 14 inches; ashy sandy loam
 C1—14 to 19 inches; loamy sand
 C2—19 to 33 inches; sand
 C3—33 to 41 inches; coarse sand
 C4—41 to 49 inches; coarse sand
 C5—49 to 60 inches; sand

Additional Components

Pend Oreille and similar soils: 5 percent
 Snowlake and similar soils: 5 percent
 Vitrandic Dystrudepts and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

131—Pearsoncreek ashy loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,800 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days

Component Description

Pearsoncreek and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 15 to 35 percent, southeast to west aspects
Elevation: 2,800 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thin mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy loam
 Bw1—3 to 9 inches; ashy loam
 Bw2—9 to 12 inches; ashy loam
 2Bw3—12 to 17 inches; gravelly sandy loam
 2BC—17 to 29 inches; very cobbly sandy loam
 2C1—29 to 50 inches; very cobbly sandy loam
 2C2—50 to 60 inches; very cobbly sandy loam

Additional Components

Dufort and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Treble and similar soils: 3 percent
 Pearsoncreek, very bouldery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

132—Pearsoncreek ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,800 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days

Component Description

Pearsoncreek and similar soils

Composition: 85 percent
Geomorphic description: Backslopes on mountains
Slope: 35 to 65 percent, southeast to west aspects
Elevation: 2,800 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thin mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 12 inches; ashy silt loam
 2Bw3—12 to 17 inches; gravelly sandy loam
 2BC—17 to 29 inches; very cobbly sandy loam
 2C1—29 to 50 inches; very cobbly sandy loam
 2C2—50 to 60 inches; very cobbly sandy loam

Additional Components

Dufort and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Treble and similar soils: 3 percent
 Pearsoncreek, very bouldery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

133—Pearsoncreek-Rock outcrop complex, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,800 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days

Component Description

Pearsoncreek and similar soils

Composition: 55 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 15 to 35 percent, southeast to west aspects
Elevation: 2,800 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thin mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 12 inches; ashy silt loam
 2Bw3—12 to 17 inches; gravelly sandy loam
 2BC—17 to 29 inches; very cobbly sandy loam
 2C1—29 to 50 inches; very cobbly sandy loam
 2C2—50 to 60 inches; very cobbly sandy loam

Rock outcrop

Composition: 30 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
 • Ridges

Additional Components

Dufort and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Treble and similar soils: 3 percent
 Pearsoncreek, very bouldery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

134—Elmira loamy fine sand, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,800 to 2,500 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 110 to 140 days

Component Description

Elmira and similar soils

Composition: 85 percent
Geomorphic description: Backslopes on dunes
Slope: 15 to 35 percent, southeast to southwest aspects
Elevation: 1,800 to 2,500 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 110 to 140 days
Surface layer texture: Loamy fine sand
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Sandy glaciolacustrine sediments or shoreline deposits with very minor amounts of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 6 inches; loamy fine sand
 Bw1—6 to 14 inches; loamy fine sand
 Bw2—14 to 26 inches; fine sand
 E&Bt—26 to 60 inches; fine sand

Additional Components

Rubson and similar soils: 5 percent
 Selle and similar soils: 5 percent
 Treble and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

135—Pend Oreille ashy silt loam, 5 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,200 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days

Component Description

Pend Oreille and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Footslopes on hills
Slope: 5 to 15 percent
Elevation: 2,200 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.5 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 Oe—2 to 3 inches; moderately decomposed plant material
 A—3 to 7 inches; ashy silt loam
 Bw1—7 to 17 inches; ashy silt loam
 Bw2—17 to 20 inches; gravelly ashy silt loam
 2Bt—20 to 30 inches; cobbly sandy loam
 2BC—30 to 60 inches; cobbly sandy loam

Additional Components

Idamont and similar soils: 5 percent
 Highfalls and similar soils: 3 percent
 Stien, moist and similar soils: 3 percent
 Pend Oreille, very bouldery and similar soils:
 2 percent
 Alfic Udivitrands, dense substratum and similar soils:
 1 percent
 Seelovers and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

136—Pend Oreille ashy silt loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,200 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days

Component Description

Pend Oreille and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 15 to 35 percent, northwest to east aspects
Elevation: 2,200 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.5 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 Oe—2 to 3 inches; moderately decomposed plant material

A—3 to 7 inches; ashy silt loam
 Bw1—7 to 17 inches; ashy silt loam
 Bw2—17 to 20 inches; gravelly ashy silt loam
 2Bt—20 to 30 inches; cobbly sandy loam
 2BC—30 to 60 inches; cobbly sandy loam

Additional Components

Highfalls and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Pend Oreille, very bouldery and similar soils:
 3 percent
 Alfic Udivitrands, dense substratum and similar soils:
 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

137—Pend Oreille ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,200 to 4,900 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days

Component Description

Pend Oreille and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 35 to 65 percent, northwest to east aspects
Elevation: 2,200 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.5 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 Oe—2 to 3 inches; moderately decomposed plant material
 A—3 to 7 inches; ashy silt loam

Bw1—7 to 17 inches; ashy silt loam
 Bw2—17 to 20 inches; gravelly ashy silt loam
 2Bt—20 to 30 inches; cobbly sandy loam
 2BC—30 to 60 inches; cobbly sandy loam

Additional Components

Highfalls and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Pend Oreille, very bouldery and similar soils:
 3 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

138—Pend Oreille-Rock outcrop complex, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,800 to 3,500 feet
Mean annual precipitation: 30 to 37 inches
Frost-free period: 70 to 100 days

Component Description

Pend Oreille and similar soils

Composition: 55 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 15 to 35 percent, northwest to east aspects
Elevation: 2,800 to 3,500 feet
Effective annual precipitation: 30 to 37 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.5 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 Oe—2 to 3 inches; moderately decomposed plant material
 A—3 to 7 inches; ashy silt loam
 Bw1—7 to 17 inches; ashy silt loam
 Bw2—17 to 20 inches; gravelly ashy silt loam

2Bt—20 to 30 inches; cobbly sandy loam
 2BC—30 to 60 inches; cobbly sandy loam

Rock outcrop

Composition: 30 percent

Definition: Rock outcrop consists of exposures of bare bedrock.

Geomorphic description:

- Side slopes on hills
- Backslopes on mountains

Additional Components

Highfalls and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Treble and similar soils: 3 percent
 Zee and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

139—Highfalls gravelly ashy silt loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,800 to 4,900 feet

Mean annual precipitation: 35 to 45 inches

Frost-free period: 80 to 110 days

Component Description

Highfalls and similar soils

Composition: 85 percent

Geomorphic description:

- Side slopes on hills
- Backslopes on mountains

Slope: 15 to 35 percent, southeast to southwest aspects

Elevation: 2,800 to 4,900 feet

Effective annual precipitation: 35 to 45 inches

Frost-free period: 80 to 110 days

Surface layer texture: Gravelly ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; gravelly ashy silt loam

Bw1—3 to 8 inches; gravelly ashy silt loam

Bw2—8 to 18 inches; gravelly ashy silt loam

2Bt—18 to 29 inches; very gravelly sandy loam

2C—29 to 60 inches; very cobbly fine sandy loam

Additional Components

Idamont and similar soils: 5 percent

Pearsoncreek and similar soils: 5 percent

Dufort and similar soils: 3 percent

Highfalls, very bouldery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

140—Frycanyon ashy silt loam, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Cropland and forestland

Field investigation intensity: Order 2

Elevation: 2,200 to 2,400 feet

Mean annual precipitation: 28 to 32 inches

Frost-free period: 100 to 135 days

Component Description

Frycanyon and similar soils

Composition: 85 percent

Geomorphic description: Terraces

Slope: 2 to 8 percent

Elevation: 2,200 to 2,400 feet

Effective annual precipitation: 28 to 32 inches

Frost-free period: 100 to 135 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash mixed in surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 11.2 inches

Typical Profile

Ap1—0 to 6 inches; ashy silt loam

Ap2—6 to 11 inches; ashy silt loam

BA—11 to 17 inches; silt loam
 Bt1—17 to 27 inches; silt loam
 Bt2—27 to 34 inches; silt loam
 Bt3—34 to 42 inches; silt loam
 Bt4—42 to 46 inches; silt loam
 Bk—46 to 52 inches; silt loam
 BC—52 to 60 inches; silt loam
 C—60 to 62 inches; loamy very fine sand

Additional Components

Rubson and similar soils: 6 percent
 Zioncreek and similar soils: 5 percent
 Porthill and similar soils: 3 percent
 Zee and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

141—Farnhamton silt loam, unprotected, drained, 0 to 4 percent slopes

Map Unit Setting

Interpretive focus: Cropland and pastureland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days

Component Description

Farnhamton, unprotected, drained and similar soils

Composition: 85 percent
Geomorphic description:
 • Flood plain
 • Natural levee
Slope: 0 to 4 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Parent material: Calcareous alluvium
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 11.3 inches

Typical Profile

Ap—0 to 7 inches; silt loam
 AC—7 to 11 inches; silt loam
 C1—11 to 22 inches; silt loam

C2—22 to 40 inches; silt loam
 C3—40 to 60 inches; silt loam

Additional Components

Ritz, unprotected, drained and similar soils:
 10 percent
 Schnoorson, unprotected, drained and similar soils:
 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

142—Ritz silt loam, unprotected, undrained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: native pastureland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 110 to 140 days

Component Description

Ritz, unprotected, undrained and similar soils

Composition: 85 percent
Geomorphic description: Flood plains
Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Calcareous silty alluvium
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 11.2 inches

Typical Profile

A—0 to 8 inches; silt loam
 Cg1—8 to 18 inches; silt loam
 Cg2—18 to 24 inches; silt loam
 Cg3—24 to 32 inches; silt loam
 Cg4—32 to 46 inches; silt loam
 Cg5—46 to 60 inches; stratified silt loam to very fine sandy loam

Additional Components

Farnhamton, unprotected, undrained and similar soils: 7 percent
 Schnoorson, unprotected, undrained and similar soils: 5 percent

DeVoignes, unprotected, undrained and similar soils:
2 percent

Typic Fluvaquents, unprotected, undrained and
similar soils: 1 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

143—Ritz-Farnhamton complex, protected, drained, 0 to 5 percent slopes

Map Unit Setting

Interpretive focus: Cropland

Field investigation intensity: Order 2

Elevation: 1,750 to 1,800 feet

Mean annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Component Description

Ritz, protected, drained and similar soils

Composition: 50 percent

Geomorphic description: Flood plains

Slope: 0 to 2 percent

Elevation: 1,750 to 1,800 feet

Effective annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Poorly drained

Parent material: Calcareous silty alluvium

Flooding: Rare

Water table: Present

Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 8 inches; silt loam

Cg1—8 to 18 inches; silt loam

Cg2—18 to 24 inches; silt loam

Cg3—24 to 32 inches; silt loam

Cg4—32 to 46 inches; silt loam

Cg5—46 to 60 inches; stratified silt loam to very fine
sandy loam

Farnhamton, protected, drained and similar soils

Composition: 40 percent

Geomorphic description:

- Flood plain

- Natural levee

Slope: 0 to 5 percent

Elevation: 1,750 to 1,800 feet

Effective annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Moderately well drained

Parent material: Calcareous alluvium

Flooding: Rare

Water table: Present

Available water capacity: Mainly 11.3 inches

Typical Profile

Ap—0 to 7 inches; silt loam

AC—7 to 11 inches; silt loam

C1—11 to 22 inches; silt loam

C2—22 to 40 inches; silt loam

C3—40 to 60 inches; silt loam

Additional Components

Schnoorson, protected, drained and similar soils:
10 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

144—Rock outcrop-Jaypeak, very stony complex, 65 to 100 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 4,800 feet

Mean annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Component Description

Rock outcrop

Composition: 50 percent

Definition: Rock outcrop consists of exposures of
bare bedrock.

Geomorphic description:

- Side slopes on escarpment

- Backslopes on mountains

Jaypeak, very stony and similar soils

Composition: 35 percent

Geomorphic description:

- Escarpments

- Backslopes on mountains

Slope: 65 to 85 percent, northwest to northeast
aspects

Elevation: 1,800 to 4,800 feet

Effective annual precipitation: 30 to 45 inches

Frost-free period: 80 to 110 days

Surface layer texture: Gravelly ashy silt loam
Rock fragments on the soil surface: .1 to 3 percent stones, 10 to 67 feet apart
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Weathered material derived from schist, gneiss, and granite bedrock with a volcanic ash mantle
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; gravelly ashy silt loam
 Bw1—3 to 9 inches; gravelly ashy silt loam
 Bw2—9 to 19 inches; gravelly ashy silt loam
 2BC—19 to 26 inches; very gravelly loam
 2C1—26 to 41 inches; extremely stony loam
 2C2—41 to 53 inches; extremely gravelly loam
 2C3—53 to 60 inches; extremely stony loam

Additional Components

Pend Oreille and similar soils: 10 percent
 McArthur, very stony and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

146—Porthill silt loam, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Cropland and forestland
Field investigation intensity: Order 2
Elevation: 2,000 to 2,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days

Component Description

Porthill and similar soils

Composition: 85 percent
Geomorphic description: Terraces
Slope: 2 to 8 percent
Elevation: 2,000 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained

Parent material: Calcareous silty and clayey glaciolacustrine sediments with very minor amounts of volcanic ash
Native plant cover type: Forestland
Flooding: None
Water table: Present
Available water capacity: Mainly 10.9 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material
 A1—1 to 8 inches; silt loam
 A2—8 to 14 inches; silt loam
 Bt1—14 to 28 inches; silty clay loam
 Bt2—28 to 33 inches; silty clay loam
 Bk1—33 to 44 inches; silty clay loam
 Bk2—44 to 52 inches; silty clay loam
 C—52 to 60 inches; silt loam

Additional Components

Frycanyon and similar soils: 5 percent
 Rubson and similar soils: 5 percent
 Zioncreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

147—Porthill silt loam, 8 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland
Field investigation intensity: Order 2
Elevation: 2,000 to 2,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days

Component Description

Porthill and similar soils

Composition: 85 percent
Geomorphic description: Terraces
Slope: 8 to 15 percent
Elevation: 2,000 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Parent material: Calcareous silty and clayey glaciolacustrine sediments with very minor amounts of volcanic ash in the surface layer

Native plant cover type: Forestland

Flooding: None

Water table: Present

Available water capacity: Mainly 10.9 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material

A1—1 to 8 inches; silt loam

A2—8 to 14 inches; silt loam

Bt1—14 to 28 inches; silty clay loam

Bt2—28 to 33 inches; silty clay loam

Bk1—33 to 44 inches; silty clay loam

Bk2—44 to 52 inches; silty clay loam

C—52 to 60 inches; silt loam

Additional Components

Frycanyon and similar soils: 5 percent

Rubson and similar soils: 5 percent

Zioncreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

148—Riverwash

Map Unit Setting

Elevation: 1,750 to 1,800 feet

Mean annual precipitation: 23 to 28 inches

Frost-free period: 120 to 140 days

Component Description

Riverwash

Composition: 95 percent

Definition: Riverwash consists of unstabilized sandy, silty, clayey, or gravelly and cobbly sediment that is flooded, washed, and reworked frequently by rivers.

Geomorphic description: Point bars

Additional Components

Ritz, unprotected, undrained and similar soils: 3 percent

Farnhamton, unprotected, undrained and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

149—Rock outcrop-McArthur, very stony complex, 65 to 100 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 4,000 feet

Mean annual precipitation: 25 to 40 inches

Frost-free period: 90 to 120 days

Component Description

Rock outcrop

Composition: 55 percent

Definition: Rock outcrop consists of exposures of bare bedrock.

Geomorphic description:

- Side slopes on escarpment
- Backslopes on mountains

McArthur, very stony and similar soils

Composition: 35 percent

Geomorphic description:

- Escarpments
 - Backslopes on mountains
- Slope:* 65 to 85 percent, southeast to west aspects
- Elevation:* 1,800 to 4,000 feet
- Effective annual precipitation:* 25 to 40 inches
- Frost-free period:* 90 to 120 days
- Surface layer texture:* Gravelly ashy very fine sandy loam

Rock fragments on the soil surface: .1 to 3 percent stones, 10 to 67 feet apart

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Weathered material derived from schist, gneiss, and granite bedrock with minor volcanic ash mantle

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 3.6 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; gravelly ashy very fine sandy loam

AB—3 to 9 inches; very cobbly ashy very fine sandy loam

Bw—9 to 17 inches; very cobbly ashy very fine sandy loam

C1—17 to 31 inches; very cobbly very fine sandy loam

C2—31 to 45 inches; very cobbly very fine sandy loam

C3—45 to 57 inches; very cobbly very fine sandy loam

C4—57 to 60 inches; very cobbly very fine sandy loam

Additional Components

Treble and similar soils: 10 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

150—Pywell muck, protected, drained, 0 to 1 percent slopes

Map Unit Setting

Interpretive focus: Cropland

Field investigation intensity: Order 2

Elevation: 1,750 to 1,800 feet

Mean annual precipitation: 23 to 28 inches

Frost-free period: 80 to 110 days

Component Description

Pywell, protected, drained and similar soils

Composition: 85 percent

Geomorphic description:

- Depression

- Flood plain

Slope: 0 to 1 percent

Elevation: 1,750 to 1,800 feet

Effective annual precipitation: 23 to 28 inches

Frost-free period: 80 to 110 days

Surface layer texture: Herbaceous highly decomposed plant material

Depth to restrictive feature: None noted

Drainage class: Very poorly drained

Parent material: Herbaceous organic material

Flooding: Rare

Water table: Present

Available water capacity: Mainly 15.4 inches

Typical Profile

Oap—0 to 10 inches; herbaceous highly decomposed plant material

Oa1—10 to 14 inches; herbaceous highly decomposed plant material

Oa2—14 to 22 inches; herbaceous highly decomposed plant material

Oa3—22 to 33 inches; herbaceous highly decomposed plant material

Oa4—33 to 70 inches; herbaceous highly decomposed plant material

Additional Components

DeVoignes, protected, drained and similar soils: 15 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

151—Pywell-DeVoignes complex, 0 to 1 percent slopes

Map Unit Setting

Interpretive focus: wildlife habitat

Field investigation intensity: Order 2

Elevation: 1,750 to 2,800 feet

Mean annual precipitation: 23 to 30 inches

Frost-free period: 80 to 120 days

Component Description

Pywell, unprotected, undrained and similar soils

Composition: 55 percent

Geomorphic description:

- Depression

- Drainageways

- Flood plains

Slope: 0 to 1 percent

Elevation: 1,750 to 2,800 feet

Effective annual precipitation: 23 to 30 inches

Frost-free period: 80 to 110 days

Surface layer texture: Herbaceous highly decomposed plant material

Depth to restrictive feature: None noted

Drainage class: Very poorly drained

Parent material: Herbaceous organic material

Flooding: Frequent

Water table: Present

Available water capacity: Mainly 15.4 inches

Typical Profile

Oa1—0 to 10 inches; herbaceous highly decomposed plant material

Oa2—10 to 14 inches; herbaceous highly decomposed plant material

Oa3—14 to 22 inches; herbaceous highly decomposed plant material

Oa4—22 to 33 inches; herbaceous highly decomposed plant material

Oa5—33 to 70 inches; herbaceous highly decomposed plant material

DeVoignes, unprotected, undrained and similar soils*Composition:* 30 percent*Geomorphic description:*

- Drainageways
- Flood plains

Slope: 0 to 1 percent*Elevation:* 1,750 to 2,800 feet*Effective annual precipitation:* 23 to 30 inches*Frost-free period:* 90 to 120 days*Surface layer texture:* Mucky silt loam*Depth to restrictive feature:* None noted*Drainage class:* Poorly drained*Parent material:* Mixed alluvium stratified with organic layers in the upper part*Flooding:* Frequent*Water table:* Present*Available water capacity:* Mainly 11.7 inches**Typical Profile**

A—0 to 9 inches; mucky silt loam

Oa/C—9 to 19 inches; stratified muck to silty clay loam

Oa/Cg—19 to 24 inches; stratified muck to silty clay loam

2Cg1—24 to 28 inches; silty clay loam

2Cg2—28 to 41 inches; silty clay loam

2Cg3—41 to 65 inches; stratified silty clay loam to silty clay

Additional Components

Schnoorson, unprotected, undrained and similar soils: 10 percent

Ritz, unprotected, undrained and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

153—Ritz-Farnhamton complex, unprotected, drained, 0 to 5 percent slopes**Map Unit Setting***Interpretive focus:* Cropland and pastureland*Field investigation intensity:* Order 2*Elevation:* 1,750 to 1,800 feet*Mean annual precipitation:* 23 to 28 inches*Frost-free period:* 120 to 140 days**Component Description****Ritz, unprotected, drained and similar soils***Composition:* 45 percent*Geomorphic description:* Flood plains*Slope:* 0 to 2 percent*Elevation:* 1,750 to 1,800 feet*Effective annual precipitation:* 23 to 28 inches*Frost-free period:* 120 to 140 days*Surface layer texture:* Silt loam*Depth to restrictive feature:* None noted*Drainage class:* Poorly drained*Parent material:* Calcareous silty alluvium*Flooding:* Occasional*Water table:* Present*Available water capacity:* Mainly 11.2 inches**Typical Profile**

Ap—0 to 8 inches; silt loam

Cg1—8 to 18 inches; silt loam

Cg2—18 to 24 inches; silt loam

Cg3—24 to 32 inches; silt loam

Cg4—32 to 46 inches; silt loam

Cg5—46 to 60 inches; stratified silt loam to very fine sandy loam

Farnhamton, unprotected, drained and similar soils*Composition:* 40 percent*Geomorphic description:*

- Flood plain
- Natural levee

Slope: 0 to 5 percent*Elevation:* 1,750 to 1,800 feet*Effective annual precipitation:* 23 to 28 inches*Frost-free period:* 120 to 140 days*Surface layer texture:* Silt loam*Depth to restrictive feature:* None noted*Drainage class:* Moderately well drained*Parent material:* Calcareous alluvium*Flooding:* Occasional*Water table:* Present*Available water capacity:* Mainly 11.3 inches**Typical Profile**

Ap—0 to 7 inches; silt loam

AC—7 to 11 inches; silt loam

C1—11 to 22 inches; silt loam

C2—22 to 40 inches; silt loam

C3—40 to 60 inches; silt loam

Additional Components

Schnoorson, unprotected, drained and similar soils:
15 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

154—Redraven medial silt loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 4,500 to 5,800 feet

Mean annual precipitation: 40 to 55 inches

Frost-free period: 30 to 90 days

Component Description

Redraven and similar soils

Composition: 85 percent

Geomorphic description:

- Lateral moraine
- Backslopes on mountains

Slope: 15 to 35 percent, northwest to northeast
aspects

Elevation: 4,800 to 5,800 feet

Effective annual precipitation: 40 to 55 inches

Frost-free period: 30 to 60 days

Surface layer texture: Medial silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite,
gneiss, and schist rocks with a thick mantle of
volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant
material

A—2 to 3 inches; medial silt loam

Bw1—3 to 6 inches; medial silt loam

Bw2—6 to 18 inches; medial silt loam

2BW3—18 to 31 inches; very gravelly sandy loam

2BC—31 to 38 inches; very gravelly sandy loam

2C1—38 to 52 inches; very gravelly sandy loam

2C2—52 to 60 inches; very gravelly sandy loam

Additional Components

Pend Oreille and similar soils: 5 percent

Rubycreek, very bouldery and similar soils: 5 percent

Redraven, very bouldery and similar soils: 3 percent

Typic Haplocryands, dense substratum and similar
soils: 2 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

155—Redraven medial silt loam, 35 to 65 percent slopes, bouldery

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 4,500 to 5,800 feet

Mean annual precipitation: 40 to 55 inches

Frost-free period: 30 to 90 days

Component Description

Redraven, bouldery and similar soils

Composition: 85 percent

Geomorphic description: Backslopes on mountains

Slope: 35 to 65 percent, northwest to northeast
aspects

Elevation: 4,800 to 5,800 feet

Effective annual precipitation: 40 to 55 inches

Frost-free period: 30 to 60 days

Surface layer texture: Medial silt loam

Rock fragments on the soil surface: .01 to .1 percent
boulders, 27 to 83 feet apart

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite,
gneiss, and schist rocks with a thick mantle of
volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant
material

A—2 to 3 inches; medial silt loam

Bw1—3 to 6 inches; medial silt loam

Bw2—6 to 18 inches; medial silt loam

2Bw3—18 to 31 inches; very gravelly sandy loam
 2BC—31 to 38 inches; very gravelly sandy loam
 2C1—38 to 52 inches; very gravelly sandy loam
 2C2—52 to 60 inches; very gravelly sandy loam

Additional Components

Baldeagle and similar soils: 5 percent
 Rubycreek, very bouldery and similar soils: 5 percent
 Pend Oreille and similar soils: 2 percent
 Redraven, very bouldery and similar soils: 2 percent
 Typic Haplocryands, dense substratum and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

156—Ritz silt loam, protected, drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days

Component Description

Ritz, protected, drained and similar soils

Composition: 85 percent
Geomorphic description: Flood plains
Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Calcareous silty alluvium
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 8 inches; silt loam
 Cg1—8 to 18 inches; silt loam
 Cg2—18 to 24 inches; silt loam
 Cg3—24 to 32 inches; silt loam
 Cg4—32 to 46 inches; silt loam
 Cg5—46 to 60 inches; stratified silt loam to very fine sandy loam

Additional Components

Schnoorson, protected, drained and similar soils: 10 percent
 Farnhamton, protected, drained and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

157—Ritz-Schnoorson complex, protected, drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days

Component Description

Ritz, protected, drained and similar soils

Composition: 45 percent
Geomorphic description: Flood plains
Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Calcareous silty alluvium
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 8 inches; silt loam
 Cg1—8 to 18 inches; silt loam
 Cg2—18 to 24 inches; silt loam
 Cg3—24 to 32 inches; silt loam
 Cg4—32 to 46 inches; silt loam
 Cg5—46 to 60 inches; stratified silt loam to very fine sandy loam

Schnoorson, protected, drained and similar soils

Composition: 40 percent
Geomorphic description:

- Depression
- Flood plain
- Swale

Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Silty and clayey alluvium
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 6 inches; silty clay loam
 Cg1—6 to 20 inches; silty clay loam
 Cg2—20 to 31 inches; silty clay loam
 Cg3—31 to 40 inches; silty clay loam
 Cg4—40 to 65 inches; silty clay

Additional Components

Farnhamton, protected, drained and similar soils:
 10 percent
 DeVoignes, protected, drained and similar soils:
 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

158—Roman, extremely bouldery-Rock outcrop complex, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 4,800 to 6,000 feet
Mean annual precipitation: 45 to 55 inches
Frost-free period: 30 to 60 days

Component Description

Roman, extremely bouldery and similar soils

Composition: 60 percent
Geomorphic description: Backslopes on mountains
Slope: 35 to 65 percent, southeast to southwest aspects
Elevation: 4,800 to 6,000 feet
Effective annual precipitation: 45 to 55 inches
Frost-free period: 30 to 60 days
Surface layer texture: Medial loam
Rock fragments on the soil surface: 3 to 15 percent boulders, 3 to 10 feet apart
Depth to restrictive feature: None noted

Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thin mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.8 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material
 A—1 to 3 inches; medial loam
 Bw1—3 to 6 inches; cobbly medial loam
 Bw2—6 to 12 inches; cobbly medial loam
 2Bw3—12 to 25 inches; very cobbly sandy loam
 2BC—25 to 31 inches; very cobbly loamy sand
 2C1—31 to 44 inches; very cobbly loamy sand
 2C2—44 to 60 inches; very cobbly sand

Rock outcrop

Composition: 30 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description: Backslopes on mountains

Additional Components

Redraven, bouldery and similar soils: 5 percent
 Rubycreek, very bouldery and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

159—Rock outcrop

Map Unit Setting

Interpretive focus: not suitable for most land use
Field investigation intensity: Order 2
Elevation: 1,800 to 4,800 feet
Mean annual precipitation: 25 to 45 inches
Frost-free period: 80 to 130 days

Component Description

Rock outcrop

Composition: 95 percent
Definition: Rock outcrop consists of exposures of bare bedrock, mainly granite, gneiss, and schist. The rock outcrop is fractured in places with some soil material in the crevices.
Geomorphic description:

- Escarpments
- Mountains
- Ridges

Additional Components

Dufort and similar soils: 1 percent
 Jaypeak, very stony and similar soils: 1 percent
 Kriest and similar soils: 1 percent
 McArthur, very stony and similar soils: 1 percent
 Treble, very stony and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

162—Rock outcrop-Treble, very stony complex, 5 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,800 to 3,800 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 90 to 130 days

Component Description

Rock outcrop

Composition: 55 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description:

- Hills
- Mountains

Treble, very stony and similar soils

Composition: 30 percent
Geomorphic description:

- Side slopes on hills
- Backslopes on mountains

Slope: 5 to 35 percent, southeast to southwest aspects
Elevation: 1,800 to 3,800 feet
Effective annual precipitation: 25 to 35 inches
Frost-free period: 90 to 130 days
Surface layer texture: Gravelly ashy sandy loam
Rock fragments on the soil surface: .1 to 3 percent stones, 3 to 27 feet apart
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with minor amounts of volcanic ash and loess in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 4 inches; gravelly ashy sandy loam
 Bw1—4 to 8 inches; gravelly ashy sandy loam
 Bw2—8 to 14 inches; gravelly ashy sandy loam
 Bt1—14 to 24 inches; very gravelly sandy loam
 Bt2—24 to 34 inches; very gravelly sandy loam
 Bt3—34 to 60 inches; very gravelly sandy loam

Additional Components

Dufort and similar soils: 6 percent
 Kriest and similar soils: 6 percent
 Idamont and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

163—Rock outcrop-Treble, very stony complex, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,800 to 3,800 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 90 to 130 days

Component Description

Rock outcrop

Composition: 55 percent
Definition: Rock outcrop consists of exposures of bare bedrock.
Geomorphic description: Backslopes on mountains

Treble, very stony and similar soils

Composition: 30 percent
Geomorphic description: Backslopes on mountains
Slope: 35 to 65 percent, southeast to southwest aspects
Elevation: 1,800 to 3,800 feet
Effective annual precipitation: 25 to 35 inches
Frost-free period: 90 to 130 days
Surface layer texture: Gravelly ashy sandy loam
Rock fragments on the soil surface: .1 to 3 percent stones, 3 to 27 feet apart
Depth to restrictive feature: None noted
Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with minor amounts of volcanic ash and loess in surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 3.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 4 inches; gravelly ashy sandy loam

Bw1—4 to 8 inches; gravelly ashy sandy loam

Bw2—8 to 14 inches; gravelly ashy sandy loam

Bt1—14 to 24 inches; very gravelly sandy loam

Bt2—24 to 34 inches; very gravelly sandy loam

Bt3—34 to 60 inches; very gravelly sandy loam

Additional Components

Dufort and similar soils: 6 percent

Kriest and similar soils: 6 percent

Idamont and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

164—Rubycreek medial silt loam, moist, 30 to 55 percent slopes, very bouldery

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 5,000 to 6,000 feet

Mean annual precipitation: 45 to 60 inches

Frost-free period: 30 to 60 days

Component Description

Rubycreek, moist, very bouldery and similar soils

Composition: 85 percent

Geomorphic description: Backslopes on mountains

Slope: 30 to 55 percent, north to east aspects

Elevation: 5,000 to 6,000 feet

Effective annual precipitation: 45 to 60 inches

Frost-free period: 30 to 60 days

Surface layer texture: Medial silt loam

Rock fragments on the soil surface: .1 to 3 percent boulders, 3 to 27 feet apart

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thin mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 4.7 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 2 inches; medial silt loam

Bw1—2 to 7 inches; medial silt loam

Bw2—7 to 11 inches; medial silt loam

2Bw3—11 to 19 inches; very stony loam

2Bt—19 to 28 inches; very cobbly loam

2C—28 to 60 inches; very cobbly sandy loam

Additional Components

Redraven, bouldery and similar soils: 5 percent

Roman, extremely bouldery and similar soils:
5 percent

Rubycreek, moist, extremely bouldery and similar
soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

165—Rubson ashy silt loam, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Cropland and forestland

Field investigation intensity: Order 2

Elevation: 2,100 to 2,700 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 100 to 135 days

Component Description

Rubson and similar soils (fig. 6)

Composition: 85 percent

Geomorphic description: Terraces

Slope: 0 to 2 percent

Elevation: 2,100 to 2,700 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 100 to 135 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash in surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 10.3 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oe—2 to 3 inches; moderately decomposed plant material

A—3 to 5 inches; ashy silt loam

Bw1—5 to 11 inches; ashy silt loam

Bw2—11 to 17 inches; ashy silt loam

Bt1—17 to 26 inches; silt loam

Bt2—26 to 32 inches; silt loam

Bt3—32 to 35 inches; silt loam

Bt4—35 to 53 inches; very fine sandy loam

Bt5—53 to 58 inches; very fine sandy loam

C—58 to 60 inches; loamy very fine sand

Additional Components

Frycanyon and similar soils: 5 percent

Zioncreek and similar soils: 5 percent

Andic Hapludalfs and similar soils: 2 percent

Selle and similar soils: 2 percent

Porthill and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

166—Rubson ashy silt loam, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Cropland and forestland

Field investigation intensity: Order 2

Elevation: 2,100 to 2,700 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 100 to 135 days

Component Description

Rubson and similar soils

Composition: 85 percent

Geomorphic description: Terraces

Slope: 2 to 8 percent

Elevation: 2,100 to 2,700 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 100 to 135 days

Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained



Figure 6.—An area of Rubson ashy silt loam, 2 to 8 percent slopes, that is used for hay and timber production.

Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 Oe—2 to 3 inches; moderately decomposed plant material
 A—3 to 5 inches; ashy silt loam
 Bw1—5 to 11 inches; ashy silt loam
 Bw2—11 to 17 inches; ashy silt loam
 Bt1—17 to 26 inches; silt loam
 Bt2—26 to 32 inches; silt loam
 Bt3—32 to 35 inches; silt loam
 Bt4—35 to 53 inches; very fine sandy loam
 Bt5—53 to 58 inches; very fine sandy loam
 C—58 to 60 inches; loamy very fine sand

Additional Components

Frycanyon and similar soils: 5 percent
 Zioncreek and similar soils: 5 percent
 Andic Hapludalfs and similar soils: 2 percent
 Selle and similar soils: 2 percent
 Porthill and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

167—Rubson ashy silt loam, 8 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland
Field investigation intensity: Order 2
Elevation: 2,100 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days

Component Description

Rubson and similar soils

Composition: 85 percent
Geomorphic description: Terraces
Slope: 8 to 15 percent
Elevation: 2,100 to 2,700 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted

Drainage class: Well drained
Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 Oe—2 to 3 inches; moderately decomposed plant material
 A—3 to 5 inches; ashy silt loam
 Bw1—5 to 11 inches; ashy silt loam
 Bw2—11 to 17 inches; ashy silt loam
 Bt1—17 to 26 inches; silt loam
 Bt2—26 to 32 inches; silt loam
 Bt3—32 to 35 inches; silt loam
 Bt4—35 to 53 inches; very fine sandy loam
 Bt5—53 to 58 inches; very fine sandy loam
 C—58 to 60 inches; loamy very fine sand

Additional Components

Zioncreek and similar soils: 6 percent
 Selle and similar soils: 5 percent
 Artnoc and similar soils: 2 percent
 Porthill and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

168—Rubycreek medial silt loam, 15 to 35 percent slopes, very bouldery

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 5,000 to 6,000 feet
Mean annual precipitation: 45 to 60 inches
Frost-free period: 30 to 60 days

Component Description

Rubycreek, very bouldery and similar soils

Composition: 85 percent
Geomorphic description: Backslopes on mountains
Slope: 15 to 35 percent, southeast to southwest aspects
Elevation: 5,000 to 6,000 feet
Effective annual precipitation: 45 to 60 inches
Frost-free period: 30 to 60 days

Surface layer texture: Medial silt loam
Rock fragments on the soil surface: .1 to 3 percent
 boulders, 3 to 27 feet apart
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite,
 gneiss, and schist rocks with a thin mantle of
 volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 A—1 to 2 inches; medial silt loam
 Bw1—2 to 7 inches; medial silt loam
 Bw2—7 to 11 inches; medial silt loam
 2Bw3—11 to 19 inches; very stony loam
 2Bt—19 to 28 inches; very cobbly loam
 2C—28 to 60 inches; very cobbly sandy loam

Additional Components

Redriven and similar soils: 5 percent
 Roman, extremely bouldery and similar soils:
 5 percent
 Rubycreek, extremely bouldery and similar soils:
 3 percent
 Typic Haplocryands, dense substratum and similar
 soils: 2 percent

Management

For management information about this map unit,
 see appropriate sections in Part II of this publication.

169—Rubycreek medial silt loam, 35 to 65 percent slopes, very bouldery

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 5,000 to 6,000 feet
Mean annual precipitation: 45 to 60 inches
Frost-free period: 30 to 60 days

Component Description

Rubycreek, very bouldery and similar soils
Composition: 85 percent
Geomorphic description: Backslopes on mountains
Slope: 35 to 65 percent, southeast to southwest
 aspects
Elevation: 5,000 to 6,000 feet
Effective annual precipitation: 45 to 60 inches

Frost-free period: 30 to 60 days
Surface layer texture: Medial silt loam
Rock fragments on the soil surface: .1 to 3 percent
 boulders, 3 to 27 feet apart
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite,
 gneiss, and schist rocks with a thin mantle of
 volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 A—1 to 2 inches; medial silt loam
 Bw1—2 to 7 inches; medial silt loam
 Bw2—7 to 11 inches; medial silt loam
 2Bw3—11 to 19 inches; very stony loam
 2Bt—19 to 28 inches; very cobbly loam
 2C—28 to 60 inches; very cobbly sandy loam

Additional Components

Redriven, bouldery and similar soils: 5 percent
 Roman, extremely bouldery and similar soils:
 5 percent
 Rubycreek, extremely bouldery and similar soils:
 3 percent
 Typic Haplocryands, dense substratum and similar
 soils: 2 percent

Management

For management information about this map unit,
 see appropriate sections in Part II of this publication.

170—Schnoorson silt loam, protected, drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days

Component Description

**Schnoorson, protected, drained and similar soils
 (fig. 7)**
Composition: 85 percent
Geomorphic description: Flood plains
Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches



Figure 7.—In the foreground is an area of Schnoorson-DeVoignes complex, protected, drained, 0 to 2 percent slopes, that is used for grass seed and canola production.

Frost-free period: 120 to 140 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Silty and clayey alluvium
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 6 inches; silt loam
 Cg1—6 to 20 inches; silt loam
 Cg2—20 to 31 inches; silt loam
 Cg3—31 to 40 inches; silty clay loam
 Cg4—40 to 65 inches; silty clay loam

Additional Components

DeVoignes, protected, drained and similar soils:
 5 percent
 Farnhamton, protected, drained and similar soils:
 5 percent
 Ritz, protected, drained and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

171—Seelovers silt loam, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: wildlife habitat
Field investigation intensity: Order 2
Elevation: 1,800 to 3,000 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 80 to 110 days

Component Description

Seelovers and similar soils

Composition: 85 percent
Geomorphic description:
 • Flood plain
 • Valley floor

Slope: 0 to 2 percent
Elevation: 1,800 to 3,000 feet
Effective annual precipitation: 24 to 30 inches
Frost-free period: 80 to 110 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Alluvium
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 11.8 inches

Typical Profile

A1—0 to 6 inches; silt loam
 A2—6 to 12 inches; silt loam
 Bg1—12 to 17 inches; silt loam
 Bg2—17 to 29 inches; silt loam
 Cg—29 to 60 inches; silt loam

Additional Components

Typic Fluvaquents and similar soils: 5 percent
 Aquic Udifluvents and similar soils: 3 percent
 DeVoignes and similar soils: 3 percent
 Pywell and similar soils: 2 percent
 Rubson and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

172—Seelovers silt loam, drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Hayland and pastureland
Field investigation intensity: Order 2
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 80 to 110 days

Component Description

Seelovers, drained and similar soils

Composition: 85 percent
Geomorphic description:
 • Flood plain
 • Valley floor
Slope: 0 to 2 percent
Elevation: 1,800 to 2,600 feet
Effective annual precipitation: 24 to 30 inches
Frost-free period: 80 to 110 days

Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Alluvium
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 11.8 inches

Typical Profile

A1—0 to 6 inches; silt loam
 A2—6 to 12 inches; silt loam
 Bg1—12 to 17 inches; silt loam
 Bg2—17 to 29 inches; silt loam
 Cg—29 to 60 inches; silt loam

Additional Components

Aquic Udifluvents, drained and similar soils: 5 percent
 Typic Fluvaquents, drained and similar soils: 5 percent
 DeVoignes, drained and similar soils: 2 percent
 Pywell, drained and similar soils: 2 percent
 Rubson and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

173—Schnoorson silty clay loam, protected, drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days

Component Description

Schnoorson, protected, drained and similar soils

Composition: 85 percent
Geomorphic description:
 • Depression
 • Flood plain
 • Swale
Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 120 to 140 days
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained

Parent material: Silty and clayey alluvium

Flooding: Rare

Water table: Present

Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 6 inches; silty clay loam

Cg1—6 to 20 inches; silty clay loam

Cg2—20 to 31 inches; silty clay loam

Cg3—31 to 40 inches; silty clay loam

Cg4—40 to 65 inches; silty clay

Additional Components

DeVoignes, protected, drained and similar soils:
5 percent

Farnhamton, protected, drained and similar soils:
5 percent

Ritz, protected, drained and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

174—Selle ashy fine sandy loam, 0 to 7 percent slopes

Map Unit Setting

Interpretive focus: Cropland, hayland, and forestland

Field investigation intensity: Order 2

Elevation: 2,000 to 2,500 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 100 to 130 days

Component Description

Selle and similar soils

Composition: 85 percent

Geomorphic description: Terraces

Slope: 0 to 7 percent

Elevation: 2,000 to 2,500 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 100 to 130 days

Surface layer texture: Ashy fine sandy loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Sandy glaciolacustrine sediments
with minor amounts of volcanic in surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant
material

A—2 to 3 inches; ashy fine sandy loam

Bw1—3 to 6 inches; ashy fine sandy loam

Bw2—6 to 17 inches; ashy fine sandy loam

Bw3—17 to 33 inches; loamy fine sand

E&Bt—33 to 42 inches; fine sand

C—42 to 60 inches; fine sand

Additional Components

Elmira and similar soils: 5 percent

Rubson and similar soils: 5 percent

Snowlake and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

175—Selle-Elmira complex, 0 to 20 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland

Field investigation intensity: Order 2

Elevation: 2,000 to 2,500 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 100 to 140 days

Component Description

Selle and similar soils (fig. 8)

Composition: 45 percent

Geomorphic description: Terraces

Slope: 0 to 7 percent

Elevation: 2,000 to 2,500 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 100 to 130 days

Surface layer texture: Ashy fine sandy loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Sandy glaciolacustrine sediments
with minor amounts of volcanic ash in surface
layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant
material

A—2 to 3 inches; ashy fine sandy loam



Figure 8.—An area of Selle-Elmira complex, 0 to 20 percent slopes, that is used for hay and timber production.

Bw1—3 to 6 inches; ashy fine sandy loam
 Bw2—6 to 17 inches; ashy fine sandy loam
 Bw3—17 to 33 inches; loamy fine sand
 E&Bt—33 to 42 inches; fine sand
 C—42 to 60 inches; fine sand

Elmira and similar soils

Composition: 40 percent
Geomorphic description: Dunes
Slope: 0 to 20 percent, west to southeast aspects
Elevation: 2,000 to 2,500 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 110 to 140 days
Surface layer texture: Loamy fine sand
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Sandy glaciolacustrine sediments or shoreline deposits with very minor amounts of volcanic ash
Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 4.1 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 6 inches; loamy fine sand
 Bw1—6 to 14 inches; loamy fine sand
 Bw2—14 to 26 inches; fine sand
 E&Bt—26 to 60 inches; fine sand

Additional Components

Rubson and similar soils: 5 percent
 Snowlake and similar soils: 5 percent
 Vitrandic Dystrudepts and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

176—Snowlake ashy sandy loam, 12 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,800 to 4,800 feet
Mean annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days

Component Description

Snowlake and similar soils

Composition: 85 percent
Geomorphic description: Terraces
Slope: 12 to 35 percent, southwest to southeast aspects
Elevation: 3,000 to 4,800 feet
Effective annual precipitation: 30 to 45 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy sandy loam
 Bw1—3 to 7 inches; ashy sandy loam
 Bw2—7 to 14 inches; ashy sandy loam
 BC—14 to 25 inches; loamy sand
 C1—25 to 39 inches; fine gravelly loamy coarse sand
 C2—39 to 52 inches; fine gravelly coarse sand
 C3—52 to 62 inches; gravelly coarse sand

Additional Components

Dodgecreek and similar soils: 5 percent
 Pearsoncreek and similar soils: 5 percent
 Myrtlecreek and similar soils: 3 percent
 Vitrandic Dystrudepts and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

177—Snowlake ashy sandy loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 3,000 to 4,800 feet
Mean annual precipitation: 35 to 45 inches
Frost-free period: 90 to 120 days

Component Description

Snowlake and similar soils

Composition: 85 percent
Geomorphic description:
 • Backslopes on canyons
 • Escarpments
Slope: 35 to 65 percent, west to southeast aspects
Elevation: 3,000 to 4,800 feet
Effective annual precipitation: 35 to 45 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy glacial outwash with minor amounts of volcanic ash mixed in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy sandy loam
 Bw1—3 to 7 inches; ashy sandy loam
 Bw2—7 to 14 inches; ashy sandy loam
 BC—14 to 25 inches; loamy sand
 C1—25 to 39 inches; fine gravelly loamy coarse sand
 C2—39 to 52 inches; fine gravelly coarse sand
 C3—52 to 62 inches; gravelly coarse sand

Additional Components

Myrtlecreek and similar soils: 8 percent
 Vitrandic Dystrudepts and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

179—Stien gravelly ashy silt loam, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland
Field investigation intensity: Order 2
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days

Component Description

Stien and similar soils

Composition: 85 percent
Geomorphic description:
 • Lateral moraine
 • Outwash terrace
Slope: 2 to 8 percent
Elevation: 1,800 to 2,800 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial outwash and drift with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; gravelly ashy silt loam
 Bw1—3 to 6 inches; gravelly ashy silt loam
 Bw2—6 to 17 inches; very gravelly ashy silt loam
 2BC—17 to 27 inches; extremely cobbly sandy loam
 3C—27 to 60 inches; extremely cobbly coarse sand

Additional Components

Dufort and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Stien, very cobbly and similar soils: 3 percent
 Rubson and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

182—Stien cobbly ashy silt loam, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland
Field investigation intensity: Order 2
Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days

Component Description

Stien and similar soils

Composition: 85 percent
Geomorphic description:
 • Lateral moraine
 • Outwash terrace
Slope: 2 to 8 percent
Elevation: 2,200 to 2,800 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days
Surface layer texture: Cobbly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial outwash and drift with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; cobbly ashy silt loam
 Bw1—3 to 6 inches; cobbly ashy silt loam
 Bw2—6 to 17 inches; very cobbly ashy silt loam
 2BC—17 to 27 inches; extremely cobbly sandy loam
 3C—27 to 60 inches; extremely cobbly coarse sand

Additional Components

Dufort and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Stien, ashy silt loam and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

184—Treble, very bouldery-Rock outcrop complex, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 3,800 feet

Mean annual precipitation: 25 to 35 inches

Frost-free period: 90 to 120 days

Component Description

Treble, very bouldery and similar soils

Composition: 55 percent

Geomorphic description:

- Escarpments

- Backslopes on mountains

Slope: 35 to 65 percent, west to southeast aspects

Elevation: 1,800 to 3,800 feet

Effective annual precipitation: 25 to 35 inches

Frost-free period: 90 to 120 days

Surface layer texture: Gravelly ashy sandy loam

Rock fragments on the soil surface: .1 to 3 percent boulders, 10 to 67 feet apart

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with minor amounts of volcanic ash and loess in surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 3.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 4 inches; gravelly ashy sandy loam

Bw1—4 to 8 inches; gravelly ashy sandy loam

Bw2—8 to 14 inches; gravelly ashy sandy loam

Bt1—14 to 24 inches; very gravelly sandy loam

Bt2—24 to 34 inches; very gravelly sandy loam

Bt3—34 to 60 inches; very gravelly sandy loam

Rock outcrop

Composition: 30 percent

Definition: Rock outcrop consists of exposures of bare bedrock.

Geomorphic description:

- Side slopes on escarpment

- Backslopes on mountains

- Ridges

Additional Components

Dufort and similar soils: 5 percent

Kriest and similar soils: 5 percent

Idamont and similar soils: 3 percent

Vitrantic Dystroxerepts and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

185—Treble gravelly ashy sandy loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 3,800 feet

Mean annual precipitation: 25 to 35 inches

Frost-free period: 90 to 130 days

Component Description

Treble and similar soils

Composition: 85 percent

Geomorphic description:

- Escarpments

- Backslopes on mountains

Slope: 35 to 65 percent, west to southeast aspects

Elevation: 1,800 to 3,800 feet

Effective annual precipitation: 25 to 35 inches

Frost-free period: 90 to 130 days

Surface layer texture: Gravelly ashy sandy loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with minor amounts of volcanic ash and loess in surface layers

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 3.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 4 inches; gravelly ashy sandy loam

Bw1—4 to 8 inches; gravelly ashy sandy loam

Bw2—8 to 14 inches; gravelly ashy sandy loam

Bt1—14 to 24 inches; very gravelly sandy loam

Bt2—24 to 34 inches; very gravelly sandy loam

Bt3—34 to 60 inches; very gravelly sandy loam

Additional Components

Dufort and similar soils: 5 percent
Idamont and similar soils: 5 percent
Treble, very stony and similar soils: 3 percent
Vitrandic Dystroxerepts and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

186—Treble gravelly ashy sandy loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,000 to 3,700 feet
Mean annual precipitation: 25 to 35 inches
Frost-free period: 90 to 130 days

Component Description

Treble and similar soils

Composition: 85 percent
Geomorphic description:

- Escarpments
- Side slopes on hills
- Backslopes on mountains

Slope: 15 to 35 percent, southeast to southwest aspects
Elevation: 2,000 to 3,700 feet
Effective annual precipitation: 25 to 35 inches
Frost-free period: 90 to 130 days
Surface layer texture: Gravelly ashy sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with minor amounts of volcanic ash and loess in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
Oe—1 to 2 inches; moderately decomposed plant material
A—2 to 4 inches; gravelly ashy sandy loam
Bw1—4 to 8 inches; gravelly ashy sandy loam
Bw2—8 to 14 inches; gravelly ashy sandy loam
Bt1—14 to 24 inches; very gravelly sandy loam
Bt2—24 to 34 inches; very gravelly sandy loam
Bt3—34 to 60 inches; very gravelly sandy loam

Additional Components

Dufort and similar soils: 5 percent
Idamont and similar soils: 5 percent
Treble, very stony and similar soils: 3 percent
Vitrandic Dystroxerepts and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

187—Schnoorson-DeVoignes complex, protected, drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: Cropland
Field investigation intensity: Order 2
Elevation: 1,750 to 1,800 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 90 to 130 days

Component Description

Schnoorson, protected, drained and similar soils

Composition: 45 percent
Geomorphic description: Flood plains
Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet
Effective annual precipitation: 23 to 28 inches
Frost-free period: 100 to 130 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Silty and clayey alluvium
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.2 inches

Typical Profile

Ap—0 to 6 inches; silt loam
Cg1—6 to 20 inches; silty clay loam
Cg2—20 to 31 inches; silty clay loam
Cg3—31 to 40 inches; silty clay loam
Cg4—40 to 65 inches; silty clay

DeVoignes, protected, drained and similar soils

Composition: 40 percent
Geomorphic description:

- Depression
- Flood plain
- Swale

Slope: 0 to 2 percent
Elevation: 1,750 to 1,800 feet

Effective annual precipitation: 23 to 28 inches
Frost-free period: 90 to 120 days
Surface layer texture: Mucky silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Mixed alluvium stratified with organic layers in the upper part
Flooding: Rare
Water table: Present
Available water capacity: Mainly 11.7 inches

Typical Profile

Ap—0 to 9 inches; mucky silt loam
 Oa/C—9 to 19 inches; stratified muck to silty clay loam
 Oa/Cg—19 to 24 inches; stratified muck to silty clay loam
 2Cg1—24 to 28 inches; silty clay loam
 2Cg2—28 to 41 inches; silty clay loam
 2Cg3—41 to 65 inches; stratified silty clay loam to silty clay

Additional Components

Farnhamton, protected, drained and similar soils: 5 percent
 Pywell, protected, drained and similar soils: 5 percent
 Ritz, protected, drained and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

188—Stien ash silt loam, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland
Field investigation intensity: Order 2
Elevation: 2,100 to 2,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days

Component Description

Stien and similar soils

Composition: 85 percent
Geomorphic description:
 • Lateral moraine
 • Outwash terrace
Slope: 2 to 8 percent
Elevation: 2,100 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 110 days
Surface layer texture: Ashy silt loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial outwash and drift with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 17 inches; gravelly ashy silt loam
 Bw3—17 to 20 inches; very gravelly ashy silt loam
 2BC—20 to 31 inches; very gravelly sandy loam
 3C—31 to 60 inches; extremely gravelly coarse sand

Additional Components

Dufort and similar soils: 5 percent
 Rubson and similar soils: 5 percent
 Idamont and similar soils: 3 percent
 Stien, very cobbly and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

189—Flemingcreek silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 1,800 to 2,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 100 to 130 days

Component Description

Flemingcreek and similar soils

Composition: 85 percent
Geomorphic description: Escarpments
Slope: 35 to 65 percent, southeast to west aspects
Elevation: 1,800 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 130 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glaciolacustrine sediments
Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 11.2 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; silt loam

BA—3 to 11 inches; silt loam

Bt1—11 to 18 inches; silty clay loam

Bt2—18 to 32 inches; silty clay loam

Bk1—32 to 48 inches; silt loam

Bk2—48 to 60 inches; silt loam

Additional Components

Artnoc and similar soils: 5 percent

Caboose and similar soils: 5 percent

Wishbone and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

190—Wishbone-Caboose complex, 35 to 75 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 2,700 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 100 to 140 days

Component Description

Wishbone and similar soils

Composition: 60 percent

Geomorphic description: Escarpments

Slope: 35 to 75 percent, southeast to southwest aspects

Elevation: 1,800 to 2,700 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 110 to 140 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Calcareous glaciolacustrine sediments

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 11.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 7 inches; silt loam

Bt—7 to 20 inches; silt loam

Btk—20 to 60 inches; silt loam

Caboose and similar soils

Composition: 25 percent

Geomorphic description: Escarpments

Slope: 35 to 75 percent, southeast to west aspects

Elevation: 1,800 to 2,700 feet

Effective annual precipitation: 25 to 30 inches

Frost-free period: 100 to 130 days

Surface layer texture: Very fine sandy loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Calcareous glaciolacustrine sediments

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 10.4 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material

A—1 to 5 inches; very fine sandy loam

AB1—5 to 9 inches; very fine sandy loam

AB2—9 to 21 inches; very fine sandy loam

Bt1—21 to 35 inches; silt loam

Bt2—35 to 57 inches; silt loam

Bk—57 to 60 inches; very fine sandy loam

Additional Components

Artnoc and similar soils: 5 percent

Flemingcreek and similar soils: 5 percent

Treble and similar soils: 3 percent

Crash and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

191—Dufort-Rock outcrop-Kriest complex, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 1,800 to 3,600 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 90 to 120 days

Component Description

Dufort and similar soils

Composition: 45 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 15 to 35 percent, southeast to west aspects
Elevation: 1,800 to 3,600 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 120 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 9 inches; ashy silt loam
 Bw2—9 to 18 inches; gravelly ashy silt loam
 2Bt1—18 to 25 inches; very gravelly sandy loam
 2Bt2—25 to 36 inches; very cobbly sandy loam
 2Bt3—36 to 47 inches; very cobbly sandy loam
 2Bt4—47 to 52 inches; very cobbly fine sandy loam
 2C—52 to 60 inches; extremely stony sandy loam

Rock outcrop

Composition: 25 percent
Definition: Rock outcrop consists of areas of exposed granitic bedrock.
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
 • Ridges

Kriest and similar soils

Composition: 20 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
 • Ridges
Slope: 15 to 35 percent, southeast to west aspects
Elevation: 1,800 to 3,600 feet

Effective annual precipitation: 25 to 30 inches
Frost-free period: 90 to 120 days
Surface layer texture: Gravelly ashy sandy loam
Depth to restrictive feature:
Bedrock (paralithic): 40 to 60 inches
Drainage class: Well drained
Parent material: Glacial till and residuum derived from granite, gneiss, and schist rocks with minor amounts of loess and volcanic ash in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant material
 A—2 to 4 inches; gravelly ashy sandy loam
 Bw1—4 to 8 inches; gravelly ashy sandy loam
 Bw2—8 to 18 inches; gravelly ashy sandy loam
 Bt1—18 to 27 inches; gravelly sandy loam
 Bt2—27 to 34 inches; gravelly sandy loam
 BC—34 to 43 inches; gravelly loamy sand
 2Cr—43 to 60 inches; weathered bedrock

Additional Components

Treble and similar soils: 4 percent
 Dufort, very stony and similar soils: 3 percent
 Idamont and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

192—Zioncreek-Porthill complex, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Cropland and forestland
Field investigation intensity: Order 2
Elevation: 2,100 to 2,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days

Component Description

Zioncreek and similar soils

Composition: 45 percent
Geomorphic description: Terraces
Slope: 2 to 8 percent
Elevation: 2,100 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days

Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash mixed in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 11.3 inches

Typical Profile

Ap1—0 to 5 inches; ashy silt loam
 Ap2—5 to 9 inches; ashy silt loam
 Bt1—9 to 19 inches; silty clay loam
 Bt2—19 to 27 inches; silty clay loam
 Bk—27 to 34 inches; silty clay loam
 C1—34 to 52 inches; stratified silt loam to silty clay loam
 C2—52 to 60 inches; silty clay loam

Porthill and similar soils

Composition: 40 percent
Geomorphic description: Terraces
Slope: 2 to 8 percent
Elevation: 2,100 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Parent material: Calcareous silty and clayey glaciolacustrine sediments with very minor amounts of volcanic ash in surface layer
Native plant cover type: Forestland
Flooding: None
Water table: Present
Available water capacity: Mainly 10.9 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant material
 A1—1 to 8 inches; silt loam
 A2—8 to 14 inches; silt loam
 Bt1—14 to 28 inches; silty clay loam
 Bt2—28 to 33 inches; silty clay loam
 Bk1—33 to 44 inches; silty clay loam
 Bk2—44 to 52 inches; silty clay loam
 C—52 to 60 inches; silt loam

Additional Components

Frycanyon and similar soils: 10 percent
 Rubson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

193—Zee ashy silt loam, 2 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,100 to 3,800 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 80 to 110 days

Component Description

Zee and similar soils

Composition: 85 percent
Geomorphic description:
 • Bench
 • Footslopes on hills
Slope: 2 to 15 percent, northwest to southeast aspects
Elevation: 2,100 to 3,800 feet
Effective annual precipitation: 30 to 40 inches
Frost-free period: 80 to 110 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.8 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 7 inches; ashy silt loam
 Bw2—7 to 16 inches; ashy silt loam
 2Bt1—16 to 24 inches; loam
 2Bt2—24 to 30 inches; loam
 2BC—30 to 60 inches; cobbly loam

Additional Components

Dodgecreek and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

194—Zee ashy silt loam, 15 to 35 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,600 to 3,800 feet
Mean annual precipitation: 30 to 40 inches
Frost-free period: 80 to 110 days

Component Description

Zee and similar soils

Composition: 85 percent
Geomorphic description: Side slopes on hills
Slope: 15 to 35 percent, northwest to southeast aspects
Elevation: 2,600 to 3,800 feet
Effective annual precipitation: 30 to 40 inches
Frost-free period: 80 to 110 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.8 inches

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
 A—2 to 3 inches; ashy silt loam
 Bw1—3 to 7 inches; ashy silt loam
 Bw2—7 to 16 inches; ashy silt loam
 2Bt1—16 to 24 inches; loam
 2Bt2—24 to 30 inches; loam
 2BC—30 to 60 inches; cobbly loam

Additional Components

Idamont and similar soils: 5 percent
 Pend Oreille and similar soils: 5 percent
 Dodgecreek and similar soils: 3 percent
 Myrtlecreek and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

195—Zioncreek-Porthill complex, 8 to 15 percent slopes

Map Unit Setting

Interpretive focus: Forestland and pastureland
Field investigation intensity: Order 2
Elevation: 2,100 to 2,400 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days

Component Description

Zioncreek and similar soils

Composition: 45 percent
Geomorphic description: Terraces
Slope: 8 to 15 percent
Elevation: 2,100 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glaciolacustrine sediments with minor amounts of volcanic ash mixed in surface layers
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 11.3 inches

Typical Profile

Ap1—0 to 5 inches; ashy silt loam
 Ap2—5 to 9 inches; ashy silt loam
 Bt1—9 to 19 inches; silty clay loam
 Bt2—19 to 27 inches; silty clay loam
 Bk—27 to 34 inches; silty clay loam
 C1—34 to 52 inches; stratified silt loam to silty clay loam
 C2—52 to 60 inches; silty clay loam

Porthill and similar soils

Composition: 40 percent
Geomorphic description: Terraces
Slope: 8 to 15 percent
Elevation: 2,100 to 2,400 feet
Effective annual precipitation: 25 to 30 inches
Frost-free period: 100 to 135 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted

Drainage class: Moderately well drained
Parent material: Calcareous silty and clayey
 glaciolacustrine sediments with very minor
 amounts of volcanic ash in the surface layer
Native plant cover type: Forestland
Flooding: None
Water table: Present
Available water capacity: Mainly 10.9 inches

Typical Profile

Oi & Oe—0 to 1 inch; slightly decomposed plant
 material
 A1—1 to 8 inches; silt loam
 A2—8 to 14 inches; silt loam
 Bt1—14 to 28 inches; silty clay loam
 Bt2—28 to 33 inches; silty clay loam
 Bk1—33 to 44 inches; silty clay loam
 Bk2—44 to 52 inches; silty clay loam
 C—52 to 60 inches; silt loam

Additional Components

Rubson and similar soils: 7 percent
 Frycanyon and similar soils: 5 percent
 Seelovers and similar soils: 3 percent

Management

For management information about this map unit,
 see appropriate sections in Part II of this publication.

196—Highfalls gravelly ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,800 to 4,900 feet
Mean annual precipitation: 35 to 45 inches
Frost-free period: 80 to 110 days

Component Description

Highfalls and similar soils

Composition: 85 percent
Geomorphic description:
 • Side slopes on hills
 • Backslopes on mountains
Slope: 35 to 65 percent, southeast to west aspects
Elevation: 2,800 to 4,900 feet
Effective annual precipitation: 35 to 45 inches
Frost-free period: 80 to 110 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted

Drainage class: Well drained
Parent material: Glacial till derived from granite,
 gneiss, and schist rocks with a thick mantle of
 volcanic ash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
 Oe—1 to 2 inches; moderately decomposed plant
 material
 A—2 to 3 inches; gravelly ashy silt loam
 Bw1—3 to 8 inches; gravelly ashy silt loam
 Bw2—8 to 18 inches; gravelly ashy silt loam
 2Bt—18 to 29 inches; very gravelly sandy loam
 2C—29 to 60 inches; very cobbly fine sandy loam

Additional Components

Dufort and similar soils: 5 percent
 Idamont and similar soils: 5 percent
 Pend Oreille and similar soils: 3 percent
 Highfalls, very bouldery and similar soils: 2 percent

Management

For management information about this map unit,
 see appropriate sections in Part II of this publication.

197—Pend Oreille-Stien, moist complex, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 30 to 32 inches
Frost-free period: 70 to 110 days

Component Description

Pend Oreille and similar soils

Composition: 45 percent
Geomorphic description:
 • Lateral moraine
 • Outwash terrace
Slope: 2 to 8 percent
Elevation: 2,300 to 2,800 feet
Effective annual precipitation: 30 to 32 inches
Frost-free period: 70 to 100 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained

Parent material: Glacial till derived from granite, gneiss, and schist rocks with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 5.7 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; ashy silt loam

Bw1—3 to 8 inches; ashy silt loam

Bw2—8 to 20 inches; gravelly ashy silt loam

2Bt1—20 to 27 inches; cobbly sandy loam

2Bt2—27 to 38 inches; cobbly sandy loam

2C—38 to 60 inches; very cobbly sandy loam

Stien, moist and similar soils

Composition: 40 percent

Geomorphic description:

- Lateral moraine
- Outwash terrace

Slope: 2 to 8 percent

Elevation: 2,300 to 2,800 feet

Effective annual precipitation: 30 to 32 inches

Frost-free period: 90 to 110 days

Surface layer texture: Gravelly ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial outwash and drift with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 2.9 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; gravelly ashy silt loam

Bw1—3 to 6 inches; gravelly ashy silt loam

Bw2—6 to 17 inches; very gravelly ashy silt loam

2BC—17 to 27 inches; extremely cobbly sandy loam

3C—27 to 60 inches; extremely cobbly coarse sand

Additional Components

Idamont and similar soils: 5 percent

Rubson and similar soils: 5 percent

Stien, very cobbly and similar soils: 3 percent

Caribouridge and similar soils: 1 percent

Treble and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

198—Stien gravelly ashy silt loam, moist, 2 to 8 percent slopes

Map Unit Setting

Interpretive focus: Forestland

Field investigation intensity: Order 2

Elevation: 2,000 to 2,800 feet

Mean annual precipitation: 28 to 32 inches

Frost-free period: 80 to 110 days

Component Description

Stien, moist and similar soils

Composition: 85 percent

Geomorphic description: Outwash terraces

Slope: 2 to 8 percent

Elevation: 2,000 to 2,800 feet

Effective annual precipitation: 28 to 32 inches

Frost-free period: 90 to 110 days

Surface layer texture: Gravelly ashy silt loam

Depth to restrictive feature: None noted

Drainage class: Well drained

Parent material: Glacial outwash and drift with a thick mantle of volcanic ash

Native plant cover type: Forestland

Flooding: None

Available water capacity: Mainly 2.9 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 3 inches; gravelly ashy silt loam

Bw1—3 to 6 inches; gravelly ashy silt loam

Bw2—6 to 17 inches; very gravelly ashy silt loam

2BC—17 to 27 inches; extremely cobbly sandy loam

3C—27 to 60 inches; extremely cobbly coarse sand

Additional Components

Idamont and similar soils: 5 percent

Pend Oreille and similar soils: 5 percent

Rubson and similar soils: 3 percent

Stien, very cobbly and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

199—Seelovers-Typic Fluvaquents-Aquic Udifluvents complex, 0 to 4 percent slopes

Map Unit Setting

Interpretive focus: wildlife habitat

Field investigation intensity: Order 2

Elevation: 1,800 to 3,000 feet

Mean annual precipitation: 23 to 35 inches

Frost-free period: 80 to 120 days

Component Description

Seelovers and similar soils

Composition: 30 percent

Geomorphic description:

- Flood plain
- Valley floor

Slope: 0 to 2 percent

Elevation: 1,800 to 3,000 feet

Effective annual precipitation: 23 to 35 inches

Frost-free period: 80 to 110 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Poorly drained

Parent material: Alluvium

Native plant cover type: Forestland

Flooding: Frequent

Water table: Present

Available water capacity: Mainly 11.8 inches

Typical Profile

A1—0 to 6 inches; silt loam

A2—6 to 12 inches; silt loam

Bg1—12 to 17 inches; silt loam

Bg2—17 to 29 inches; silt loam

Cg—29 to 60 inches; silt loam

Typic Fluvaquents and similar soils

Composition: 30 percent

Geomorphic description:

- Flood plain
- Valley floor

Slope: 0 to 2 percent

Elevation: 1,800 to 3,000 feet

Effective annual precipitation: 23 to 35 inches

Frost-free period: 80 to 110 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Poorly drained

Parent material: Stratified alluvium

Native plant cover type: Forestland

Flooding: Frequent

Water table: Present

Available water capacity: Mainly 6.0 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 4 inches; silt loam

AC—4 to 12 inches; silt loam

Cg1—12 to 27 inches; stratified very fine sandy loam to loamy fine sand

Cg2—27 to 42 inches; stratified very fine sandy loam to sand

Cg3—42 to 60 inches; stratified loamy sand to very cobbly coarse sand

Aquic Udifluvents and similar soils

Composition: 30 percent

Geomorphic description:

- Flood plain
- Valley floor

Slope: 0 to 4 percent

Elevation: 1,800 to 3,000 feet

Effective annual precipitation: 23 to 35 inches

Frost-free period: 90 to 120 days

Surface layer texture: Silt loam

Depth to restrictive feature: None noted

Drainage class: Somewhat poorly drained

Parent material: Stratified alluvium

Native plant cover type: Forestland

Flooding: Occasional

Water table: Present

Available water capacity: Mainly 5.9 inches

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 4 inches; silt loam

AC—4 to 9 inches; silt loam

C—9 to 24 inches; stratified very fine sandy loam to loamy fine sand

Cg1—24 to 44 inches; stratified very fine sandy loam to coarse sand

Cg2—44 to 60 inches; stratified loamy sand to very cobbly coarse sand

Additional Components

DeVoignes and similar soils: 3 percent

Pywell and similar soils: 3 percent

Riverwash: 2 percent

Rubson and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

200—Pywell-DeVoignes complex, partially drained, 0 to 2 percent slopes

Map Unit Setting

Interpretive focus: pastureland

Field investigation intensity: Order 2

Elevation: 1,750 to 2,600 feet

Mean annual precipitation: 24 to 30 inches

Frost-free period: 80 to 120 days

Component Description

Pywell, partially drained and similar soils

Composition: 45 percent

Geomorphic description:

- Depression
- Flood plain
- Valley floor

Slope: 0 to 1 percent

Elevation: 1,750 to 2,600 feet

Effective annual precipitation: 24 to 30 inches

Frost-free period: 80 to 110 days

Surface layer texture: Herbaceous highly decomposed plant material

Depth to restrictive feature: None noted

Drainage class: Very poorly drained

Parent material: Herbaceous organic material

Flooding: Frequent

Water table: Present

Available water capacity: Mainly 15.4 inches

Typical Profile

Oa1—0 to 10 inches; herbaceous highly decomposed plant material

Oa2—10 to 14 inches; herbaceous highly decomposed plant material

Oa3—14 to 22 inches; herbaceous highly decomposed plant material

Oa4—22 to 33 inches; herbaceous highly decomposed plant material

Oa5—33 to 70 inches; herbaceous highly decomposed plant material

DeVoignes, partially drained and similar soils

Composition: 40 percent

Geomorphic description:

- Depression
- Flood plain
- Valley floor

Slope: 0 to 2 percent

Elevation: 1,750 to 2,600 feet

Effective annual precipitation: 24 to 30 inches

Frost-free period: 90 to 120 days

Surface layer texture: Mucky silt loam

Depth to restrictive feature: None noted

Drainage class: Poorly drained

Parent material: Mixed alluvium stratified with organic layers in the upper part

Flooding: Frequent

Water table: Present

Available water capacity: Mainly 11.7 inches

Typical Profile

A—0 to 9 inches; mucky silt loam

Oa/C—9 to 19 inches; stratified muck to silty clay loam

Oa/Cg—19 to 24 inches; stratified muck to silty clay loam

2Cg1—24 to 28 inches; silty clay loam

2Cg2—28 to 41 inches; silty clay loam

2Cg3—41 to 65 inches; stratified silty clay loam to silty clay

Additional Components

Schnoorson, partially drained and similar soils:
5 percent

Seelovers, partially drained and similar soils:
5 percent

Typic Fluvaquents, partially drained and similar soils:
5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

201—Pywell muck, unprotected, undrained, 0 to 1 percent slopes

Map Unit Setting

Interpretive focus: wildlife habitat

Field investigation intensity: Order 2

Elevation: 1,750 to 2,600 feet

Mean annual precipitation: 24 to 30 inches

Frost-free period: 80 to 110 days

Component Description

Pywell, unprotected, undrained and similar soils

Composition: 85 percent

Geomorphic description:

- Depression
- Flood plain
- Valley floor

Slope: 0 to 1 percent

Elevation: 1,750 to 2,600 feet

Effective annual precipitation: 24 to 30 inches

Frost-free period: 80 to 110 days

Surface layer texture: Herbaceous highly decomposed plant material

Depth to restrictive feature: None noted

Drainage class: Very poorly drained

Parent material: Herbaceous organic material

Flooding: Frequent

Water table: Present

Available water capacity: Mainly 15.4 inches

Typical Profile

Oa1—0 to 10 inches; herbaceous highly decomposed plant material

Oa2—10 to 14 inches; herbaceous highly decomposed plant material

Oa3—14 to 22 inches; herbaceous highly decomposed plant material

Oa4—22 to 33 inches; herbaceous highly decomposed plant material

Oa5—33 to 70 inches; herbaceous highly decomposed plant material

Additional Components

DeVoignes, unprotected, undrained and similar soils:
5 percent

Schnoorson, unprotected, undrained and similar soils: 5 percent

Seelovers, unprotected, undrained and similar soils:
5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

202—Water

Component Description

Water

Composition: 100 percent

Geomorphic description: None assigned

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity,

in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Benchland. The nearly level to gently sloping land on a high terrace separated from a lower bottomland by a steep escarpment.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Boundary, horizon. A zone or transitional layer between two adjoining horizons or layers, roughly parallel to the soil surface. Boundaries vary in distinctness and topography.

Breakland. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chroma, soil color. (See Munsell notation.)

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical

to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI).

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth class. Depth to a restrictive or contrasting layer defined as a range of depth. The nature of the restricting or contrasting layer is specified, unless it is consolidated bedrock which is understood. The following classes are used:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Droughty (in tables). The soil holds too little water (very low available water capacity) for plants during dry periods.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion hazard. An estimation of the severity of soil loss that could occur on a bare, disturbed soil without benefit of cover for protection. Classes are slight, moderate, severe, and very severe.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest habitat type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glacial trough. A broad, elongate U-shaped valley developed by glacial movement.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to

7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter

represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hue, soil color. (See Munsell notation.)

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a

low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled

by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the

resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Metasedimentary rock. Sedimentary rock of any origin that is partially altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Examples are the Belt series of rocks which include siltite, argillite, and quartzite.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percolates slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Regeneration. The new growth of a natural plant community, developing from seed.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest

bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slippage. Soil mass susceptible to movement downslope when loaded, excavated, or wet. (See Slumping.)

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Slumping. The soil mass is susceptible to movement downslope, usually with a backward rotation, when loaded, excavated, or wet. (See Slippage)

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage

has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Value, soil color. (See Munsell notation.)

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Volcanic ash mantle. A surface layer of soil that contains 30 percent or more volcanic glass, covering older soil material. It has low bulk density and high water holding capacity.

Water table. A saturated zone of free water in the soil.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wetness (in tables). The soil is wet from saturation by a high water table during the period of use.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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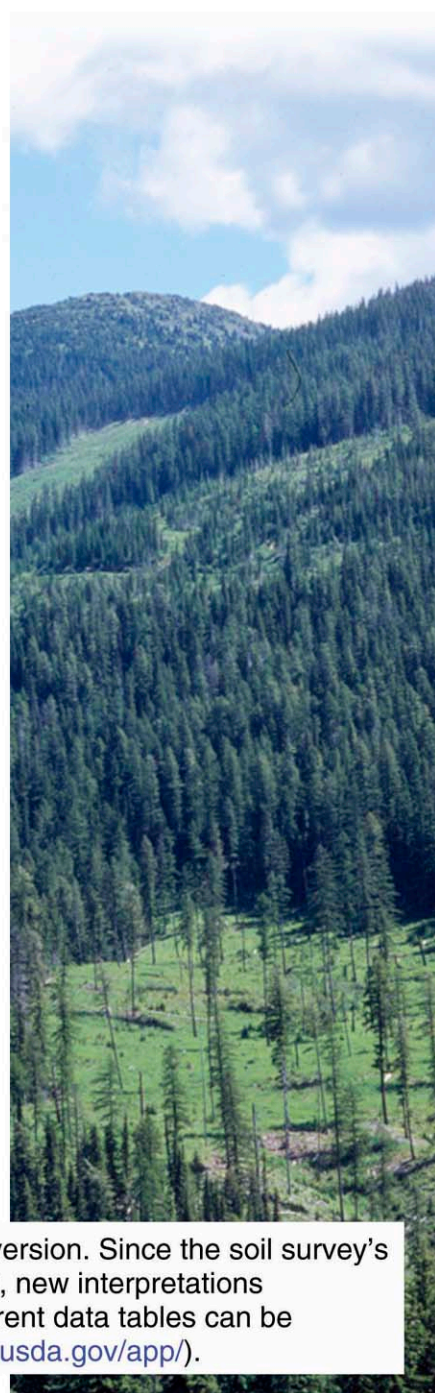
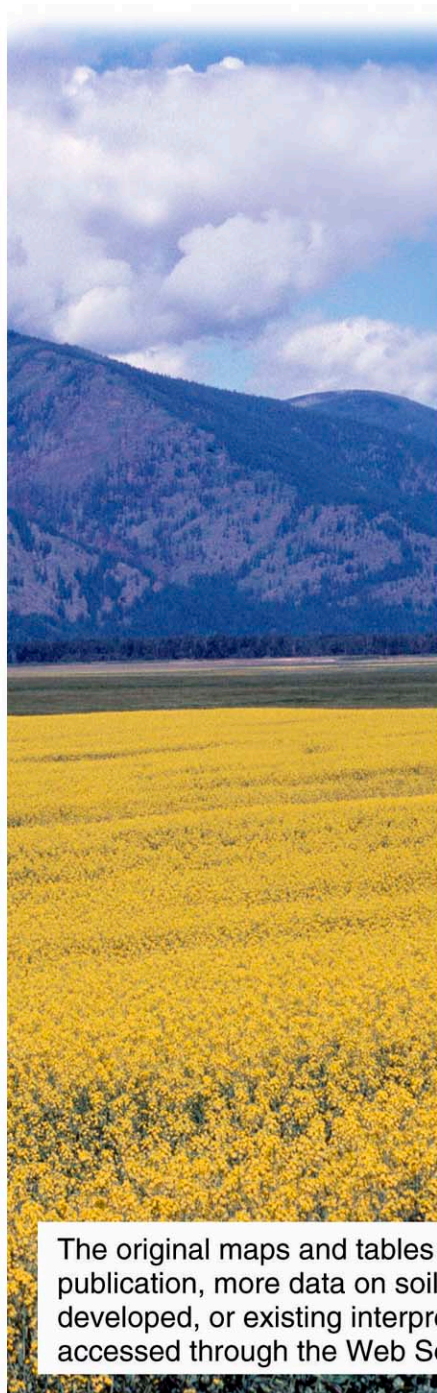
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In cooperation with the United
States Department of the
Interior, Bureau of Land
Management; University of
Idaho, College of Agriculture;
and Idaho Soil Conservation
Commission

ID601—Soil Survey of Boundary County Area, Idaho

Part II



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).

How to Use This Soil Survey

General Soil Map

The general soil map shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

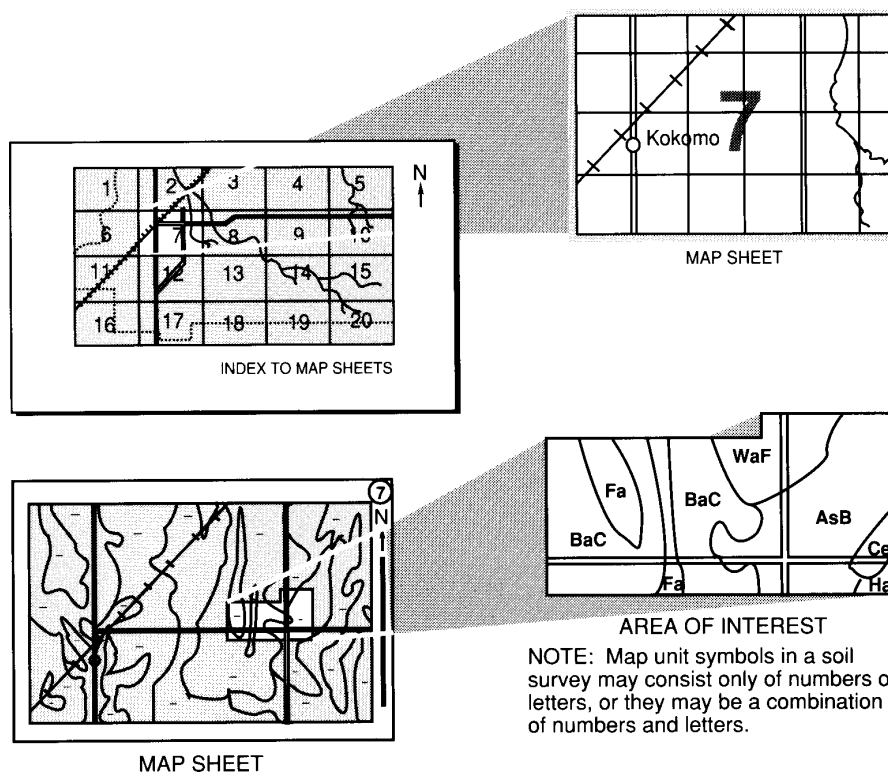
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate that area on the **Index to Map Sheets**. Go to the Web Soil Survey for more information (<http://websoilsurvey.nrcs.usda.gov/app/>)

Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described. See the Contents for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2000. Soil names and descriptions were approved in 2001. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2000. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of the Interior, Bureau of Land Management; the University of Idaho, College of Agriculture; and the Idaho Soil Conservation Commission. The survey is part of the technical assistance furnished to the Boundary Soil Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: *Left*—Schnoorson silt loam, protected, drained, 0 to 2 percent slopes, in foreground used for canola and wheat production. Rock outcrop-McArthur, very stony complex, 65 to 100 percent slopes, in background used for timber production and wildlife habitat. *Center*—Schnoorson silt loam, protected, drained, 0 to 2 percent slopes, in foreground used for wheat production. Caboose-Wishbone complex, 15 to 35 percent slopes, in middle ground used for timber production and pasture. Dufort-Rock outcrop-Kriest complex, 35 to 65 percent slopes, in background used for timber production and wildlife habitat. *Right*—Pend Oreille ashy silt loam, 35 to 65 percent slopes, used for timber production and wildlife habitat.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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Detailed Soil Map Unit Legend

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For tables with the most current data, please visit the
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Soil Survey of Boundary County Area, Idaho

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey

can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Agronomy

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Crops and Pasture

Michael Gondek, District Conservationist, NRCS, prepared this section.

The Boundary County Area contains approximately 60,000 acres of nonirrigated cropland, pasture, and hayland (figs. 9 and 10). The majority of land used for crops, pasture, and hay is located adjacent to the Kootenai River.

The main crops grown in the survey area are spring wheat, winter wheat, oats, barley, alfalfa hay, clover seed, timothy seed, canola, and hops. A small, but significant acreage is used for ornamental nursery production of both deciduous and coniferous plants. Most of the soils in the bottomland along the Kootenai River are drained by a system of open ditches and pumps and protected from flooding by a system of levees. Maintaining these systems is essential for crop production.

The soils on the high benches and terraces are subject to erosion where they are sloping. When grain is grown, crop residue should be left on the surface to maintain the organic matter content and tilth of the soil and to control erosion. Conservation tillage systems are essential in the management of these soils. Crop residue on the soil surface is most important during the fall and winter months to protect the soil from erosion. Use of minimum tillage, no-till practices, cross-slope farming, or conservation-cropping systems is advisable.

Grain generally responds to nitrogen and sulfur fertilizer, and legumes respond to phosphorus. A good fertilization program, including soil testing, is essential for the highest grain production.

Hay crops consist of alfalfa and alfalfa-grass mixed. With correct harvest management, two cuttings can be obtained in most years. During wetter years, a third cutting can also be made. A significant acreage of timothy hay is grown in the area. Oats and barley are also grown as a hay crop when they are used in rotation to renew alfalfa stands. Hayland management can be improved by using proper fertilizers as needed, cutting hay when it is at the proper growth stage, and leaving an adequate amount of fall stubble to protect the plants during the winter.

Pastures in the survey area are relatively small. A combination of adapted grasses and legumes are generally used. Because of the small acreage, pasture can be susceptible to overgrazing. When fields are continually overgrazed throughout the year, the production of good forage is reduced; the fields are invaded by less palatable or weedy plants; and soil erosion occurs on sloping areas. Overgrazing fields adjacent to creeks and streams can cause streambank degradation, damage riparian vegetation, and reduce water quality downstream.

Improved management practices are needed to obtain high level yields of pasture. Suggested practices are controlled grazing systems, cross-fencing, water developments, and allowing adequate periods for regrowth. The use of high-producing adapted plants and a fertilizer program are essential to achieve high yields. A fertilizer program should include the application of nitrogen, phosphorus, and sulfur according to soil test results.

Livestock grazing should be carefully controlled. Animals should not be allowed to graze too early in the spring before plants have reached adequate growth and the soils are firm enough to withstand trampling. Grasses should not be grazed so close that they start regrowth from root-stored food reserves. For most grasses, leaving a stubble height of 4 inches at the end of the grazing period will allow

for rapid recovery. These practices will help limit soil compaction and protect the soil from erosion.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the “Land Capability and Yields per Acre of Crops and Pasture” tables. In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall and other climatic factors. The land capability classification of each map unit in the survey area is shown in the tables.

Yields are estimates based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of

soil and the crop. Management practices can include improving drainage, controlling erosion, and protecting areas from flooding; selecting proper planting and seeding rates; choosing suitable high-yielding crop varieties; appropriately and timely tilling; controlling weeds, plant diseases, and harmful insects; ensuring favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effectively using crop residue, barnyard manure, and green-manure crops; and harvesting to ensure the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small.



Figure 9.—In the Kootenai Valley, in the foreground, is an area of Rubson ashy silt loam, 2 to 8 percent slopes, that is used for hay, pasture, and timber production. Along the Kootenai River flood plain, in the middle ground, is an area of Schnoorson silt loam, protected, drained, 0 to 2 percent slopes, that is used for wheat, barley, and canola production.



Figure 10.—In the foreground is an area of Ritz-Schnoorson complex, protected, drained, 0 to 2 percent slopes, that is used for wheat production. In the middle ground is an area of Caboose-Wishbone complex, 15 to 35 percent slopes, that is used for timber production and pasture. In the background is an area of Dufort ashy silt loam, 35 to 65 percent slopes, that is used for timber production and wildlife habitat.

Local offices of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (USDA, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute

for interpretations designed to show suitability and limitations of groups of soils for grazingland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, grazingland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, grazingland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazingland, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, grazingland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2*e*-4 and 3*e*-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the "Land Capability and Yields per Acre of Crops and Pasture" tables.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pasture, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

The map units in the survey area that are considered prime farmland are listed in the "Prime Farmland" table. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in the "Acreage and Proportionate Extent of the Soils" table. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

Grazingland

In areas that have similar climate and topography, differences in the kind and amount of grazeable vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

The “Grazingland and Grazeable Understory-Productivity and Characteristic Plant Communities” table shows, for each soil that supports understory vegetation and for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic native vegetation; and the composition, by percentage of air-dry weight, of each species.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production (Cooper and others, 1991). Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Woodland Understory Vegetation

The table shows, for each soil suitable for woodland, the potential for producing understory vegetation. The *total dry-weight production* for understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and

unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic native vegetation—the grasses, forbs, shrubs, and other plants that make up the understory natural plant community on each soil—is listed by common name. *Forestland composition* shows the expected percentage of the total annual production for each understory plant species under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

The amount of characteristic native vegetation that can be used as forage depends on the kinds of grazing animals and on the grazing season. If well managed, some woodland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Grazingland Vegetation

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well-managed opened area that is supporting the open natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year’s growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In

an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic native vegetation—the grasses, forbs, and shrubs that make up most of the open natural plant community on each soil—is listed by common name. *Grazingland composition* shows the expected percentage of the total annual production for each grazeable plant species making up the characteristic native vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Woodland Grazing

Frank Gariglio, Forester, NRCS, and Michael Gondek, District Conservationist, NRCS, prepared this section.

Many of the native plants that occur in the forest understory can provide grazing opportunities for

livestock and big game animals (fig. 11). Introduced plants, generally grasses and legumes, that have been seeded on road cuts and fill slopes and on harvested or disturbed areas within the forest are additional forage sources for livestock. Livestock grazing is usually a lower priority for private landowners when compared to timber production on forestlands. Yet, managed understory and forest grazing can provide significant annual economic benefits for the private forestland user and landowner.

Forested soils found at lower elevations in the survey area are usually warmer and drier but offer a longer grazing season for livestock when compared to those soils found in higher elevations. Additionally, soils identified at the higher elevations of the survey area often have less livestock grazing use because of the very steep terrain and the higher percentage of tall brush species in the understory.

The amount and quality of light that reaches the ground affects plants growing beneath the tree

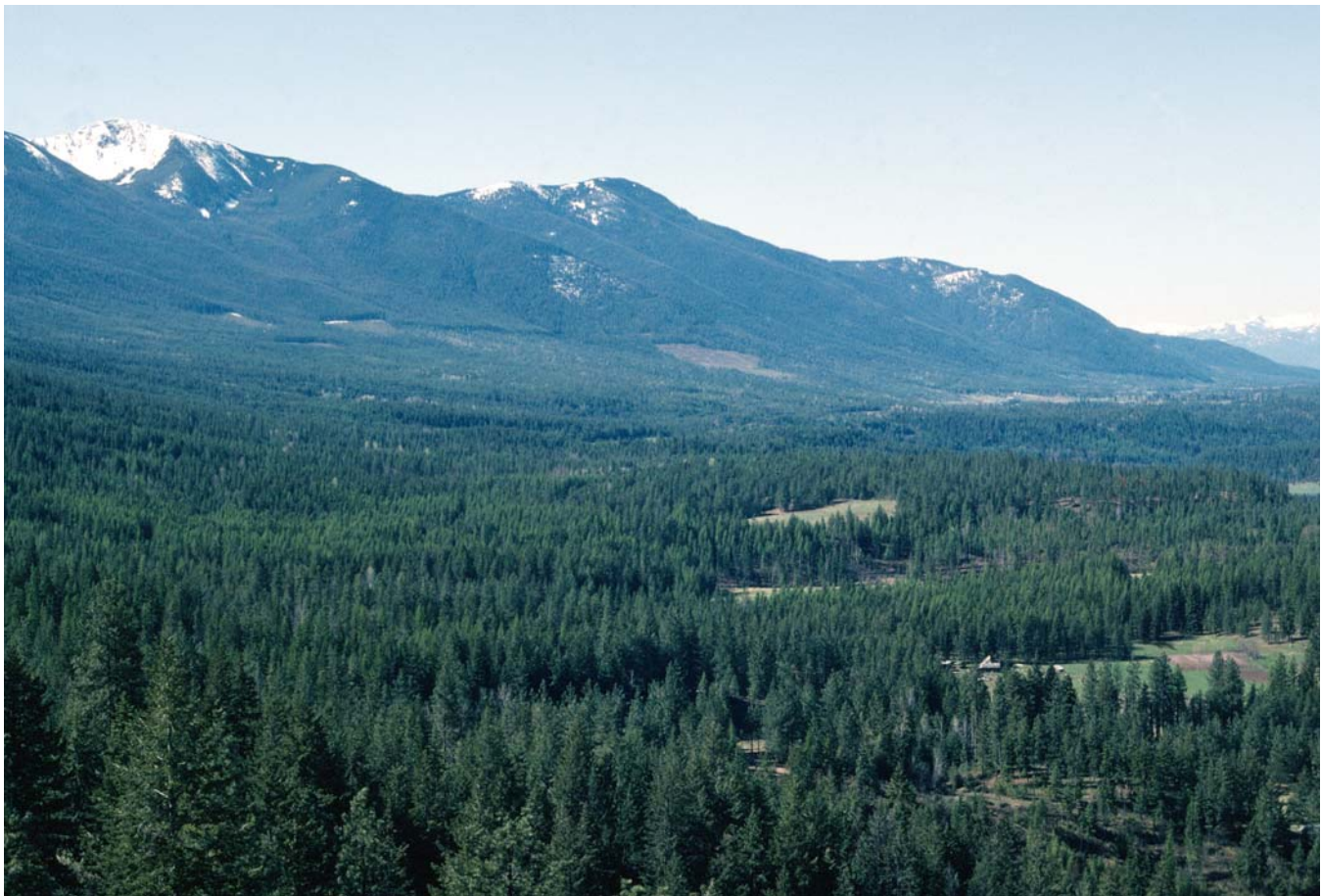


Figure 11.—In the foreground is an area of Stien gravelly ashy silt loam, 2 to 8 percent slopes, that is used for timber production and pasture. In the middle ground is an area of Pend Oreille ashy silt loam, 35 to 65 percent slopes, that is used for timber production. In the background is an area of Jaypeak gravelly ashy silt loam, 35 to 75 percent slopes, that is used for timber production and wildlife habitat.

canopy. In general, under the dense canopy of a fully stocked, mature forest, usable livestock forage is at the lowest level for the rotation of the stand. In contrast, where logging, fire, or other similar disturbance reduces the density of the forest canopy, the amount and kind of usable livestock forage increase because of the increase in sunlight and moisture that reaches the forest floor. The length of time required to complete the rotation from open seedling/sapling stage to older, mature, dense canopy stands and the corresponding variability in available forage depends on the specific plant community (Cooper and others, 1991), soil, climate, and other factors, such as management actions that are taken on the site. The potential for forage production for opened canopy forests in a well-managed condition is shown in the "Grazingland and Grazeable Understory-Productivity and Characteristic Plant Communities" table.

Cattle tend to concentrate in those areas within the forest that are the easiest to access and travel through, or that provide for all of their daily needs for

feed, water, and shelter within a short distance. For these reasons, riparian zones, meadows, and forest roads are all common areas for heavy cattle usage. Any concentration of livestock can result in overgrazing and other damage to the more palatable or sensitive plants. This in turn can lead to a corresponding increase in potential damage to riparian areas, road banks, or other soil resources. Using salt to encourage cattle to use areas further away from concentration zones, livestock herding, strategic water placement, establishing trails, and fence usage are all common livestock management practices utilized in woodland grazing systems. Seeding mixtures used in stabilizing road cut and fill slopes should be selected to minimize overuse by livestock.

Livestock grazing management should be balanced with other resource concerns within the forest. Some of the other resource concerns to address include water quality, wildlife habitat, aesthetic values, and the silvicultural goals of the landowner.

Forestland

Forestland Management and Productivity

The tables in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forest management.

Forestland Management

In the “Forestland Management” tables, interpretive ratings are given for various aspects of forestland management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified forest management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low*, *moderate*, and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management practices. More detailed information about the criteria used in the ratings is available in the “National Forestry Handbook.”

For *limitations affecting construction of haul roads and log landings*, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting; *moderate* indicates that rutting is likely; and *severe* indicates that ruts form readily.

Ratings in the column *hazard of off-road or off-trail erosion* are based on slope and on soil erodibility.

factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Forestland Productivity

In the "Forestland Productivity" table, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years (Alexander, 1967; Cochran, 1979a; Cochran, 1979b; Cochran, 1979c; Haig, 1932; Meyer, 1961; Schmidt and others, 1976). The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Handbook" (USDA, 1998), which is available in local offices of the Natural

Resources Conservation Service or on the Internet (<http://soils.usda.gov/technical/>).

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forestland in the Boundary County Area

Frank Gariglio, Forester, NRCS, and Michael Gondek, District Conservationist, NRCS, prepared this section.

The forest product industry began in Boundary County around 1890 with limited logging of the local forests and the corresponding establishment of small sawmill operations. Within a few years, more mills were established throughout the area and a variety of forest products were being manufactured. Despite many up- and downturns in the demand for wood products during the past century, the forest products industry continues to be a dominant economic force in the soil survey area (fig. 12).

The most extensive conifer species in the soil survey area are ponderosa pine, Douglas-fir, grand fir, western white pine, lodgepole pine, western hemlock, western red cedar, western larch, subalpine fir, and Engelmann spruce. Other species of lesser extent include subalpine larch and mountain hemlock. Cottonwood, quaking aspen, and birch occur on the wetter soils and along riparian zones.

Tree growth rates and the species of trees that grow on a particular site vary according to soil types. Soil depth, chemistry, texture, and available water-holding capacity in combination with aspect, elevation, and precipitation are some of the major environmental factors that influence tree species occurrences and growth rates.

This soil survey provides more detailed interpretations of the forested soils identified in the soil survey area. However, the following table is useful in identifying general soil and climatic influences on the common trees in the area.

Relative Silvical Characteristics of the Common Forest Trees in the Boundary County Soil Survey Area¹

Tolerance to:	Low	Moderate	High
Shade	WL LP	PP WP DF ES GF AF	WC
WH			
Frost	WH WC GF	PP WL DF WP AF	ES LP
Drought	WH WC AF	ES WP GF WL LP	DF PP
Fire resistance	WH WC AF	ES WP GF WL LP	DF PP
Excess water	PP DF WL GF	WP AF WH ES	WC LP
AF	Subalpine fir	PP	Ponderosa pine
DF	Douglas-fir	WC	Western red cedar
ES	Engelmann spruce	WH	Western hemlock
GF	Grand fir	WL	Western larch
LP	Lodgepole pine	WP	Western white pine

¹Adapted from Fiedler, Carl E., and Lloyd, Dennis A. 1995. Autecology and synecology of western larch. *In* ecology and management of larch forests: a look ahead." Proceedings of an international symposium, Whitefish, Montana, U.S.A. October 5-9, 1992. U.S. Department of Agriculture, Forest Service, Intermountain Research Station GTR-INT-319.

The historic occurrence of wildfires in the soil survey area heavily influenced the composition of the forests prior to the turn of the last century. Since that time, the makeup of the trees found on most of the forest stands has been altered by fire suppression, as well as by preferential harvest of the higher value trees during logging. In addition, western white pine is further compromised as a viable stand component over its historic range because of the devastation caused by white pine blister rust.

The topography of much of the forestlands in the soil survey area consists of steep and very steep mountain slopes. The remainder of the area consists of nearly level bottomlands on the Kootenai River flood plain and adjacent gently sloping benches in the valley. Forest soils are also very steep on the dissected landforms and escarpments in the Kootenai Valley. Forest harvesting methods are influenced by the steepness of the terrain. Slopes that exceed 35 percent are generally not suitable for ground machine skidding. On any ground-based system, erosion, compaction, and displacement of the soil must be carefully managed. On slopes steeper than 35 percent, highlead or skyline systems are utilized for harvesting timber.

Aspect, elevation, silvicultural history, seedbed condition, and soil characteristics influence the success of natural seedling germination, survival, and eventual establishment of mature trees within a



Figure 12.—An area of Redraven medial silt loam, 35 to 65 percent slopes, bouldery, that is used for timber production and wildlife habitat.

forest stand. Most of the soils in the soil survey area have a surface layer of varying thicknesses that has a high content of volcanic ash. The content of volcanic ash adds to the moisture and nutrient-holding capacity of the soils, which influences tree growth rates. Brackenfern and alder brush competition is present on many of the higher elevation forest soils. In many instances, the removal of the tree canopy has resulted in long-term suppression of the potential tree regeneration on these sites because of the severe brush competition.

Careful placement and construction of logging roads and skidtrails, with erosion stabilization practices installed prior to use, are necessary to prevent erosion and sedimentation on many of the forest soils in the soil survey area, especially for soils

on steeper landforms. This soil survey identifies several soils with subsoil material that can erode rapidly when exposed during road building. Soil slippage and landslides can also be a problem on some of the steep soils, especially those identified on the terrace escarpments found in the Kootenai River valley. Other forested soils in the valleys have a high water table that makes the soil wetter for longer periods throughout the year, leading to a higher compaction and displacement hazard.

The “Forestland Management” and “Forestland Productivity” tables and the map unit descriptions in the section, “Detailed Soil Map Units,” provide more information on soil-related management interpretations and limitations.

Recreation

The soils of the survey area are rated in the “Recreation” tables according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the

height, duration, intensity, and frequency of flooding is essential. The information in the “Recreation” tables can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The

soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that

affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Recreation in the Boundary County Area

The soil survey area is located in an exceptional scenic and recreational part of Idaho. It includes forested mountains; two major rivers, the Kootenai and Moyie; McArthur Lake; and many smaller lakes and streams. Fishing is good for all types of trout and other sport fishes. Deer, elk, moose, bear, and cougar inhabit the area, and big-game hunting is excellent. Grouse are plentiful in the forested, upland areas. The Kootenai National Wildlife Refuge and the McArthur Lake State Wildlife Management Area provide important waterfowl habitat. Other wetland areas along the Kootenai River and the many other ponds and streams throughout the area supply additional waterfowl habitat.

Many public and private campgrounds, resorts, and recreation areas offer excellent facilities for boating, fishing, and other outdoor activities. Opportunities exist for hiking and mountain biking during the summer and cross-country skiing and snowmobiling during the winter. The increased demand for land to provide recreational facilities is expected to continue for many years.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. Soils also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In the "Wildlife Habitat" table, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the

surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are barley, canola, hops, oats, and wheat.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are alfalfa, brome, clover, and fescue.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are false Solomon's seal, pinegrass, showy aster, and wheatgrass.

Deciduous trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of deciduous trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are aspen, chokecherry, huckleberry, and red osier dogwood. Examples of fruit-producing shrubs that are suitable for planting on soils rated good are Russian-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are common juniper, Engelmann spruce, lodgepole pine, subalpine fir, western red cedar, and western white pine.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and

features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mallow ninebark, redstem ceanothus, and snowberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are cattail, rush, and sedge.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, ponds, and waterfowl feeding areas.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include cottontail, meadowlark, pheasant, red fox, and savannah sparrow.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include bear, deer, elk, ruffed grouse, squirrel, thrush, wild turkey, and woodpecker.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Wildlife attracted to these areas include beaver, duck, geese, heron, mink, muskrat, and shore birds.

Wildlife of the Boundary County Area

Michael Gondek, District Conservationist, NRCS, and Frank J. Fink, Biologist, NRCS, prepared this section.

This section relates to the various uses that wildlife make of the soils in the survey area. Locations of different wildlife species and their activities are referenced to soil map unit numbers. The Boundary County soil survey area supports a variety of game and nongame fish and wildlife populations. The quality of wildlife habitat depends on the soil, kind and amount of vegetation, and past management.

Big game animals in the survey area consist of elk, white-tailed deer, mule deer, black bear, and moose. Elk are well suited to the habitat of the area. Most of

the soil map units below 4,800-foot elevation provide summer and winter range for elk. These soil map units include 116, 126, 136, and 185. Elk migrate to winter range on south- and west-facing slopes below 4,000-foot elevation along the major river valleys. Creating new brush fields and rehabilitating existing brush fields on these winter ranges is critical to maintaining elk herds at current levels. Above 4,800-foot elevation, soil map units, including 104, 155, 164, and 168, are used strictly for summer range.

Deer in the survey area include both white-tailed deer and mule deer. White-tailed deer comprise more than half of the total deer population. White-tailed deer occupy the lower elevations, including soil map units 126, 166, 175, 179, and 190, along the valleys and river systems. Mule deer are more widely spread and occupy areas including soil map units 104, 108, 123, 124, 155, 164, 176, and 184.

A variety of upland game bird species use all of the different habitat types in the survey area. Three species of forest grouse—ruffed, blue, and spruce—inhabit forestland areas. Grouse occupy areas in soil map units such as 107, 116, 117, 126, 136, 155, 166, and 174. Ruffed grouse spend the summer in open clearings within wooded areas and then winter in conifer forests. Blue grouse move to higher elevations for wintering, but their nesting habitat is usually at lower elevations on more open, grassy, or brush-covered slopes and ridges.

Furbearers, such as beaver, mink, muskrat, and otter, live in and around creeks, wetlands, and lakes in the survey area. Soil map units 171, 142, and 199 comprise the major riparian zones in the area, but small creeks extend up into the foothills and mountains and provide additional riparian areas for these furbearers.

Where appropriate conditions permit, bobcat, coyote, fisher, lynx, marten, mountain lion, and wolverine inhabit in the survey area.

Open water areas and wetlands exist throughout the survey area, making it a major waterfowl area. Nesting occurs mainly along rivers, streams, and small lakes or ponds. Most waterfowl activity occurs in soil map units 151, 201, 142, 199, and 171. Peak fall migration of waterfowl occurs from mid October through November. These migrating waterfowl will hold over at the Kootenai National Wildlife Refuge, McArthur Lake Wildlife Management Area, the Kootenai River, and the many sloughs and ponds along the valley. The major migrating species are bufflehead, Canada geese, gadwall, goldeneye, mallard, pintail, swan, teal, wigeon, and wood duck.

Several raptors use the entire survey area for either all or part of their range. Some of the more

common and highly visible raptors are bald eagle, red-tailed hawk, goshawk osprey, and a variety of owls. The bald eagle is listed as a threatened species in the survey area, where there are active nesting sites. The bald eagle is mostly a winter visitor and feeds along the rivers and ponds associated with soil map units 119, 151, 142, 201, 199, and 171.

The main sport fisheries in the major rivers and streams of the survey area are rainbow trout, cutthroat trout, and mountain whitefish. Tributary streams contain significant spawning and rearing habitats for Kokanee salmon, rainbow trout, cutthroat trout, and brook trout. The Kootenai River has bull trout, white sturgeon, and ling (burbot). Bull trout and white sturgeon are listed as threatened and endangered under the U.S. Endangered Species Act. There are numerous small lakes containing largemouth bass, crappie, perch, bluegill, and various trout species.

The wildlife population in the survey area is largely determined by habitat suitability, including the food supply, amount of cover, and water availability. Habitats differ in their capacity to provide these essential needs. Some of these deficiencies are because of the characteristics of the soils, and others are the result of management.

Populations of game and nongame species can be enhanced by using conservation practices to improve their habitat. These practices include development of odd or irregularly shaped areas in and adjacent to farmland to provide food and cover, protection of habitat from fire or grazing, and establishment of woody vegetation to provide winter shelter. Wildlife habitat may also be enhanced through application of commonly employed conservation practices including minimum tillage, planned grazing systems, pond construction, shelterbelts and field windbreaks, and stripcropping.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

Additional interpretations can be made using the information in the tables, along with soil maps, soil descriptions, and other data provided in this survey.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The "Building Site Development" tables show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use.

The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified

classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; available water capacity in the upper 40 inches; content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding; depth to a water table; ponding; slope; stoniness; and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

The “Sanitary Facilities” tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the

solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2-feet thick is placed over the landfill. The ratings in the tables are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, reviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the

movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2-feet thick is placed over the completed landfill. The ratings in the tables are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the tables also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture; depth to a water table; ponding; rock fragments; slope; depth to bedrock or a cemented pan; reaction; and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill.

Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

The "Agricultural Waste Management" tables show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and

treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that

affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction,

management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the

design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Construction Materials

The “Construction Materials” tables give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good*, *fair*, or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill—the lower the number, the greater the limitation. The soils are rated as a probable or improbable source of sand and gravel. A rating of probable means that the

source material is likely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. The number 0.00 indicates that the soil is an improbable source. A number between 0.00 and 1.00 indicates the degree to which the soil is a probable source of sand or gravel.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the first "Construction Materials" table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of gravel or sand are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains gravel or sand, the soil is rated as a probable source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the tables do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In these tables, the soils are rated as a source of roadfill for low embankments, generally less than 6-feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is

affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

The "Water Management" tables give information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

These tables also give for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The

seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20-feet high, constructed to impound water or to protect land against overflow. In these tables, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, a cemented pan, or other layers that affect the rate of water movement; permeability; depth to a

high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. Data and estimates of soil and water features, listed in the tables, are explained on the following pages.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

Estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

The “Engineering Index Properties” table gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an

appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the “Glossary.”

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1998).

The Unified system classifies soils according to properties that affect their use as construction material (Portland Cement Association, 1973). Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

The "Physical Properties of the Soils" table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. *Silt* as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. *Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the "Physical Properties of the Soils" table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil

to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the "Physical Properties of the Soils" table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the "Physical Properties of the Soils" table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

The "Chemical Properties of the Soils" table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more

frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

The "Water Features" table gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

- Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. Mainly deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
- Group B. Soils having a moderate infiltration rate when thoroughly wet. Chiefly moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
- Group C. Soils having a slow infiltration rate when thoroughly wet. Chiefly, soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
- Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. Chiefly, clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *month* column in the table indicates the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The "Water Features" table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of

the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redox features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. *Frequency* is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information

on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

The "Soil Features" table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the *thickness* and *hardness* of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected *initial* subsidence, which usually is a result of drainage, and *total* subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and

electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For *uncoated steel*, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For *concrete*, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity,

in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Benchland. The nearly level to gently sloping land on a high terrace separated from a lower bottomland by a steep escarpment.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Boundary, horizon. A zone or transitional layer between two adjoining horizons or layers, roughly parallel to the soil surface. Boundaries vary in distinctness and topography.

Breakland. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chroma, soil color. (See Munsell notation.)

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical

to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI).

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth class. Depth to a restrictive or contrasting layer defined as a range of depth. The nature of the restricting or contrasting layer is specified, unless it is consolidated bedrock which is understood. The following classes are used:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Droughty (in tables). The soil holds too little water (very low available water capacity) for plants during dry periods.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion hazard. An estimation of the severity of soil loss that could occur on a bare, disturbed soil without benefit of cover for protection. Classes are slight, moderate, severe, and very severe.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest habitat type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glacial trough. A broad, elongate U-shaped valley developed by glacial movement.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to

7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter

represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
- E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
- B horizon.*—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
- C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
- Cr horizon.*—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.
- R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hue, soil color. (See Munsell notation.)

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a

low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled

by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the

resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Metasedimentary rock. Sedimentary rock of any origin that is partially altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Examples are the Belt series of rocks which include siltite, argillite, and quartzite.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate.

The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Regeneration. The new growth of a natural plant community, developing from seed.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest

bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slippage. Soil mass susceptible to movement downslope when loaded, excavated, or wet. (See Slumping.)

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Slumping. The soil mass is susceptible to movement downslope, usually with a backward rotation, when loaded, excavated, or wet. (See Slippage)

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage

has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Value, soil color. (See Munsell notation.)

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Volcanic ash mantle. A surface layer of soil that contains 30 percent or more volcanic glass, covering older soil material. It has low bulk density and high water holding capacity.

Water table. A saturated zone of free water in the soil.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wetness (in tables). The soil is wet from saturation by a high water table during the period of use.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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SOIL LEGEND*

LEVEL TO UNDULATING, POORLY DRAINED TO MODERATELY WELL DRAINED SOILS ON FLOOD PLAINS AND DRAINAGEWAYS

1 SCHNOORSON-DEVOIGNES-FARNHAMTON
Very deep, level to undulating, poorly drained to moderately well drained soils on flood plains

2 SEELOVERS-TYPIC FLUVAQUENTS-AQUIC UDIFLUVENTS
Very deep, level to undulating, poorly drained and somewhat poorly drained soils on flood plains and drainageways

NEARLY LEVEL TO HILLY, WELL DRAINED, MODERATELY WELL DRAINED, AND EXCESSIVELY DRAINED SOILS ON OLD GLACIAL LAKE LAID OR GLACIAL OUTWASH TERRACES OR BENCHES

3 RUBSON-PORTHILL-FRYCANYON
Very deep, nearly level to rolling, well drained and moderately well drained soils on old glacial lake laid terraces or benches

4 SELLE-ELMIRA
Very deep, nearly level to hilly, well drained and excessively drained soils on terraces and dunes

5 STIEN-PEND OREILLE
Very deep, nearly level to rolling, well drained soils on glacial outwash terraces or benches

STEEP AND VERY STEEP, WELL DRAINED SOILS ON TERRACE ESCARPMENTS AND CANYONSIDES

6 WISHBONE-CABOOSE-CRASH
Very deep, steep and very steep soils on terrace escarpments and canyonsides

STRONGLY SLOPING TO VERY STEEP, WELL DRAINED SOILS ON FOOTHILLS AND MOUNTAINS

7 PEND OREILLE-IDAMONT-TREBLE
Very deep, strongly sloping to very steep soils on foothills and mountains

8 ROCK OUTCROP-MCARTHUR-JAYPEAK
Very deep, steep to extremely steep soils and rock outcrop on mountains and breaklands

9 RUBYCREEK-REDRAVEN-BALDEAGLE
Very deep, moderately steep to very steep, cold soils on mountains and ridgetops high elevations

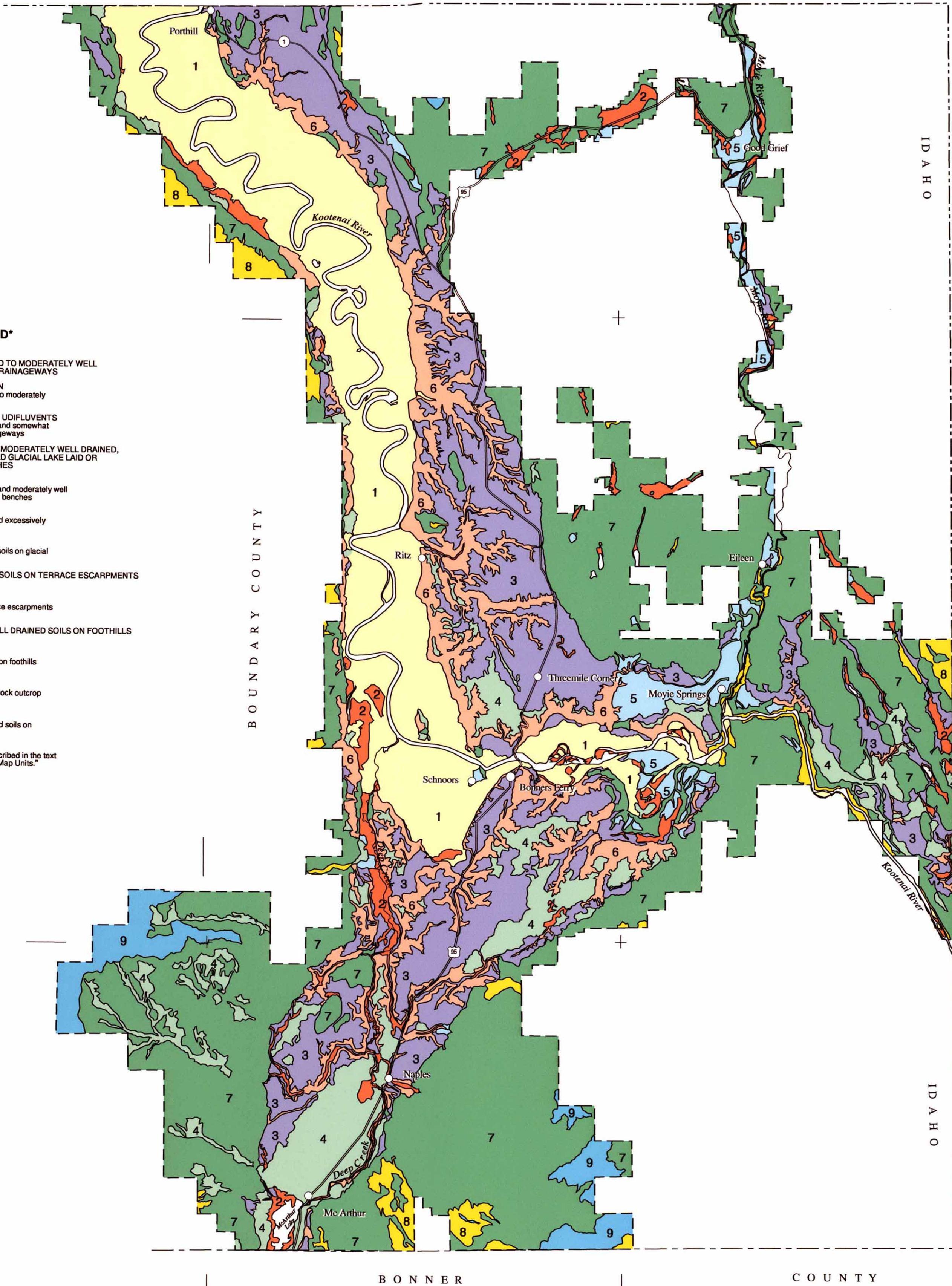
*The units on this legend are described in the text under the heading "General Soil Map Units."

SOIL LEGEND*

- LEVEL TO UNDULATING, POORLY DRAINED TO MODERATELY WELL DRAINED SOILS ON FLOOD PLAINS AND DRAINAGEWAYS
- 1 SCHNOORSON-DEVOIGNES-FARNHAMTON
Very deep, level to undulating, poorly drained to moderately well drained soils on flood plains
- 2 SEELOVERS-TYPIC FLUVAQUENTS-AQUIC UDIFLUVENTS
Very deep, level to undulating, poorly drained and somewhat poorly drained soils on flood plains and drainageways
- NEARLY LEVEL TO HILLY, WELL DRAINED, MODERATELY WELL DRAINED, AND EXCESSIVELY DRAINED SOILS ON OLD GLACIAL LAKE LAID OR GLACIAL OUTWASH TERRACES OR BENCHES
- 3 RUBSON-PORTHILL-FRYCANYON
Very deep, nearly level to rolling, well drained and moderately well drained soils on old glacial lake laid terraces or benches
- 4 SELLE-ELMIRA
Very deep, nearly level to hilly, well drained and excessively drained soils on terraces and dunes
- 5 STIEN-PEND OREILLE
Very deep, nearly level to rolling, well drained soils on glacial outwash terraces or benches
- STEEP AND VERY STEEP, WELL DRAINED SOILS ON TERRACE ESCARPMENTS AND CANYONSIDES
- 6 WISHBONE-CABOOSE-CRASH
Very deep, steep and very steep soils on terrace escarpments and canyonsides
- STRONGLY SLOPING TO VERY STEEP, WELL DRAINED SOILS ON FOOTHILLS AND MOUNTAINS
- 7 PEND OREILLE-IDAMONT-TREBLE
Very deep, strongly sloping to very steep soils on foothills and mountains
- 8 ROCK OUTCROP-MCARTHUR-JAYPEAK
Very deep, steep to extremely steep soils and rock outcrop on mountains and breaklands
- 9 RUBYCREEK-REDRAVEN-BALDEAGLE
Very deep, moderately steep to very steep, cold soils on mountains and ridgetops high elevations

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 2002



IDAHO

MONTANA
LINCOLN COUNTY



IDAHO

BONNER

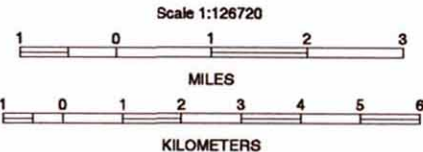
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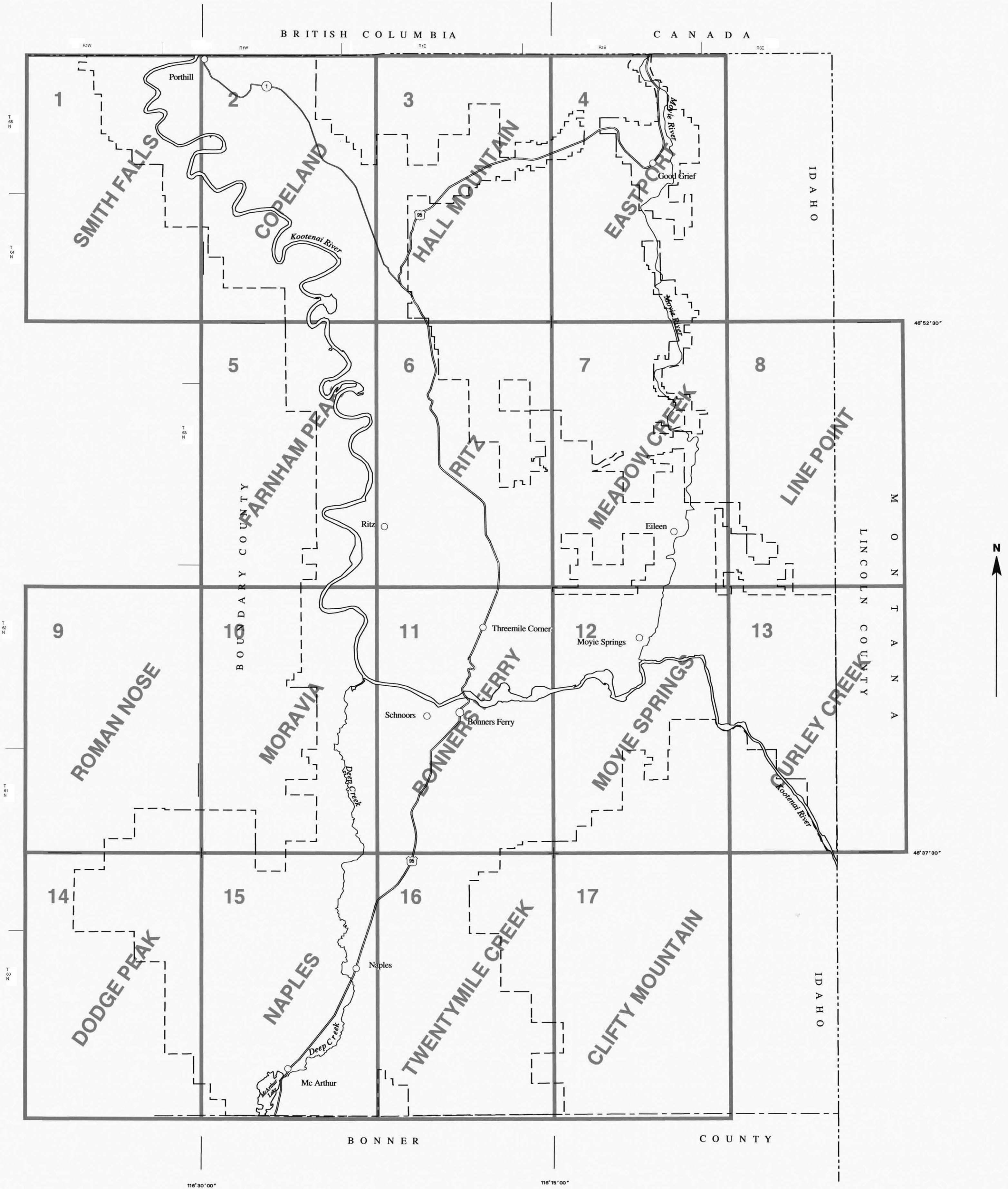
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UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
UNIVERSITY OF IDAHO, COLLEGE OF AGRICULTURE
IDAHO SOIL CONSERVATION COMMISSION

GENERAL SOIL MAP
BOUNDARY COUNTY, IDAHO





**INDEX TO MAP SHEETS
BOUNDARY COUNTY, IDAHO**



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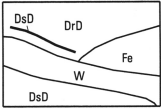
BOUNDARY COUNTY AREA, IDAHO

SOIL LEGEND

The publication symbols consist of field symbols. Symbols consist of numbers or a combination of numbers and letters, for example, 18A, 266D, 2, and 1823F. For the symbols designated by a number and a letter, the number designates the soil type and the letter designates the slope class. The symbols without a number designate a miscellaneous area. Map units are arranged numerically by field symbols.

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
101	Dufort-Rock outcrop-Kriest complex, 35 to 65 percent slopes	134	Elmira loamy fine sand, 15 to 35 percent slopes	169	Rubycreek medial silt loam, 35 to 65 percent slopes, very bouldery
102	Caboose-Wishbone complex, 15 to 35 percent slopes	135	Pend Oreille ashy silt loam, 5 to 15 percent slopes	170	Schnoorson silt loam, protected, drained, 0 to 2 percent slopes
103	Artnoc silt loam, 35 to 75 percent slopes	136	Pend Oreille ashy silt loam, 15 to 35 percent slopes	171	Seelovers silt loam, 0 to 2 percent slopes
104	Baldeagle gravelly medial silt loam, 35 to 75 percent slopes	137	Pend Oreille ashy silt loam, 35 to 65 percent slopes	172	Seelovers silt loam, drained, 0 to percent slopes
105	Bane loamy fine sand, 2 to 8 percent slopes	138	Pend Oreille-Rock outcrop complex, 15 to 35 percent slopes	173	Schnoorson silty clay loam, protected, drained, 0 to 2 percent slopes
106	Caribouridge ashy silt loam, 0 to 15 percent slopes	139	Highfalls gravelly ashy silt loam, 15 to 35 percent slopes	174	Selle ashy fine sandy loam, 0 to percent slopes
107	Caribouridge ashy silt loam, 15 to 35 percent slopes	140	Frycanyon ashy silt loam, 2 to 8 percent slopes	175	Selle-Elmira complex, 0 to 20 percent slopes
108	Caribouridge ashy silt loam, 35 to 65 percent slopes	141	Farnhamton silt loam, unprotected, drained, 0 to 4 percent slopes	176	Snowlake ashy sandy loam, 12 to 35 percent slopes
109	Caribouridge, warm-Rock outcrop complex, 15 to 35 percent slopes	142	Ritz silt loam, unprotected, undrained, 0 to 2 percent slopes	177	Snowlake ashy sandy loam, 35 to 65 percent slopes
110	Crash silt loam, 35 to 75 percent slopes	143	Ritz-Farnhamton complex, protected, drained, 0 to 5 percent slopes	179	Stien gravelly ashy silt loam, 2 to percent slopes
112	Crash-Artnoc complex, 35 to 75 percent slopes	144	Rock outcrop-Jaypeak, very stony complex, 65 to 100 percent slopes	182	Stien cobbly ashy silt loam, 2 to percent slopes
113	Caribouridge, warm-Rock outcrop complex, 35 to 65 percent slopes	146	Porthill silt loam, 2 to 8 percent slopes	184	Treble, very bouldery-Rock outcrop complex, 35 to 65 percent slopes
114	Dufort ashy silt loam, 35 to 65 percent slopes	147	Porthill silt loam, 8 to 15 percent slopes	185	Treble gravelly ashy sandy loam, 35 to 65 percent slopes
115	DeVoignes mucky silt loam, protected, drained, 0 to 1 percent slopes	148	Riverwash	186	Treble gravelly ashy sandy loam, 15 to 35 percent slopes
116	Dufort ashy silt loam, 15 to 35 percent slopes	149	Rock outcrop-McArthur, very stony complex, 65 to 100 percent slopes	187	Schnoorson-DeVoignes complex, protected, drained, 0 to 2 percent slopes
117	Dodgecreek ashy silt loam, 2 to 12 percent slopes	150	Pywell muck, protected, drained, 0 to 1 percent slopes	188	Stien ashy silt loam, 2 to 8 percent slopes
118	Farnhamton silt loam, protected, drained, 2 to 5 percent slopes	151	Pywell-DeVoignes complex, 0 to percent slopes	189	Flemingcreek silt loam, 35 to 65 percent slopes
119	Farnhamton silt loam, unprotected, undrained, 0 to 4 percent slopes	153	Ritz-Farnhamton complex, unprotected, drained, 0 to 5 percent slopes	190	Wishbone-Caboose complex, 35 to 75 percent slopes
120	Dufort ashy silt loam, 5 to 15 percent slopes	154	Redraven medial silt loam, 15 to 35 percent slopes	191	Dufort-Rock outcrop-Kriest complex, 15 to 35 percent slopes
121	Katka, very bouldery-Rock outcrop complex, 35 to 65 percent slopes	155	Redraven medial silt loam, 35 to 65 percent slopes, bouldery	192	Zioncreek-Porthill complex, 2 to percent slopes
122	Highfalls stony ashy silt loam, 35 to 65 percent slopes, bouldery	156	Ritz silt loam, protected, drained, 0 to 2 percent slopes	193	Zee ashy silt loam, 2 to 15 percent slopes
123	Jaypeak gravelly ashy silt loam, 35 to 75 percent slopes	157	Ritz-Schnoorson complex, protected, drained, 0 to 2 percent slopes	194	Zee ashy silt loam, 15 to 35 percent slopes
124	McArthur, very stony-Rock outcrop complex, 35 to 75 percent slopes	158	Roman, extremely bouldery-Rock outcrop complex, 35 to 65 percent slopes	195	Zioncreek-Porthill complex, 8 to 15 percent slopes
125	Idamont ashy silt loam, 5 to 15 percent slopes	159	Rock outcrop	196	Highfalls gravelly ashy silt loam, 35 to 65 percent slopes
126	Idamont ashy silt loam, 15 to 35 percent slopes	162	Rock outcrop-Treble, very stony complex, 5 to 35 percent slopes	197	Pend Oreille-Stien, moist complex, 2 to 8 percent slopes
127	Idamont ashy silt loam, 35 to 65 percent slopes	163	Rock outcrop-Treble, very stony complex, 35 to 65 percent slopes	198	Stien gravelly ashy silt loam, moist, 2 to 8 percent slopes
128	Myrtlecreek ashy sandy loam, 15 to 35 percent slopes	164	Rubycreek medial silt loam, moist, 30 to 55 percent slopes, very bouldery	199	Seelovers-Typic Fluvaquents-Aquic Udifluvents complex, 0 to 4 percent slopes
129	Myrtlecreek ashy sandy loam, 35 to 75 percent slopes	165	Rubson ashy silt loam, 0 to 2 percent slopes	200	Pywell-DeVoignes complex, partially drained, 0 to 2 percent slopes
131	Pearsoncreek ashy loam, 15 to 35 percent slopes	166	Rubson ashy silt loam, 2 to 8 percent slopes	201	Pywell muck, unprotected, undrained, 0 to 1 percent slopes
132	Pearsoncreek ashy silt loam, 35 to 65 percent slopes	167	Rubson ashy silt loam, 8 to 15 percent slopes	202	Water
133	Pearsoncreek-Rock outcrop complex, 15 to 35 percent slopes	168	Rubycreek medial silt loam, 15 to 35 percent slopes, very bouldery		

CONVENTIONAL AND SPECIAL
SYMBOLS LEGEND

SOIL SURVEY FEATURES		CULTURAL FEATURES	
SOIL DELINEATIONS AND SYMBOLS		BOUNDARIES	
		National, state, or providence	_____ - - -
		County or parish	_____ - _____
		Reservation (national or state forest or park)	_____ - _____
		Map sheet neatline	_____
		Public land survey system section boundary	_____
		ROAD EMBLEMS & DESIGNATIONS	
Gravel pit	✕	Federal	
Landfill	⊗	State	
Rock outcrop	▼		
Wet spot	ψ		

Symbol Definitions

LABEL	NAME	DESCRIPTION
✕	Gravel pit	An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel. Typically 2 to 5 acres.
⊗	Landfill	An area of accumulated waste products of human habitation that can be above or below natural ground level. Waste products are covered with soil material on a daily basis. Typically 2 to 5 acres.
▼	Rock outcrop	An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "Rock outcrop" is a named component of the map unit. Typically .5 to 2 acres.
⤵	Wet spot	A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit. Typically 1 to 3 acres.